



ET-7000 series

Ethernet Remote I/O Module

User Manual

Warranty

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Manual Revisions

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Revision	Date	Effective Pages	Description
1.02	09-01-19	All	Original Issue
1.03	09-04-15	All	Add ET-7015 information
1.04	09-04-30	All	Add ET-7018Z information

Table of Contents

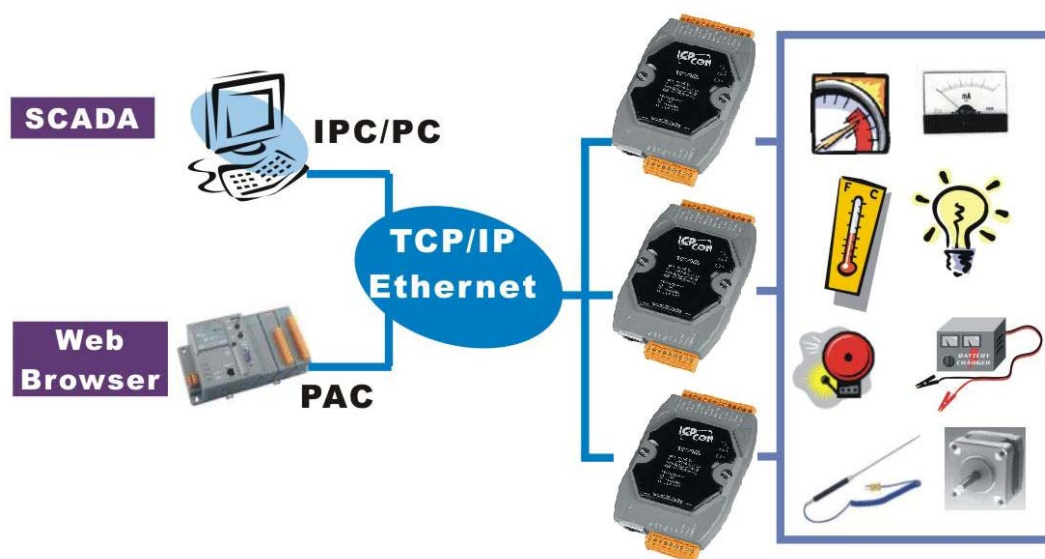
1. INTRODUCTION.....	6
1.1. FEATURES	9
1.2. GENERAL SPECIFICATIONS	12
1.3. MODULE SELECTION	13
1.4. VIEW OF THE ET-7000	23
1.5. ET-7000 INSTALLATION	27
1.5.1. Mounting the ET-7000.....	27
1.5.2. Connecting the Hardware.....	31
1.5.3. Ethernet cable wiring.....	32
1.6. I/O WIRING CONNECTION.....	34
1.7. DEFAULT SETTINGS.....	39
1.8. CALIBRATION	40
1.8.1. The calibration procedure for ET-7015:.....	40
1.8.2. The calibration procedure for ET-7017 and ET-7017-10:.....	44
1.8.3. The calibration procedure for ET-7018Z:.....	46
1.9. SOFTWARE & DOCUMENT INFORMATION	49
1.10. UPDATE INFORMATION.....	50
2. CONFIGURING THE ET-7000	51
2.1. CONFIGURING THE NETWORK SETTINGS	51
2.1.1. Using the “MiniOS7 Utility”	51
2.2. LOAD FACTORY DEFAULT.....	55
3. WEB CONFIGURATION PAGE.....	56
3.1. OVERVIEW	59
3.2. CONFIGURATION	61
3.2.1. Ethernet Settings.....	61
3.2.2. Basic Settings.....	63
3.2.3. Module I/O settings.....	69
3.3. AUTHENTICATION	73
3.3.1. Account management.....	73
3.3.2. IP filter Settings	74
3.4. WEB HMI.....	76
3.4.1. Web Editing	76
3.4.2. Web HMI.....	81
3.5. I/O PAIR CONNECTION	91
3.6. MORE INFORMATION.....	93

4.	HOW TO ACCESS ET-7000?	94
4.1.	VIA AN ETHERNET NETWORK	94
4.2.	USING THE MODBUS PROTOCOL	94
4.2.1.	<i>Introduction</i>	<i>94</i>
4.2.2.	<i>Function Codes Supported.....</i>	<i>96</i>
4.2.3.	<i>Modbus Register address table.....</i>	<i>96</i>
5.	I/O PAIR CONNECTION.....	97
6.	SOFTWARE DEVELOPMENT APPLICATION.....	98
6.1.	LOCATION OF DOCUMENTS AND SOFTWARE	98
6.2.	LABVIEW	100
7.	OPC SERVER.....	101
7.1.	INTRODUCTION.....	101
7.2.	PROCEDURE FOR USING THE OPC SERVER.....	102
7.3.	OPC SERVER EXAMPLE USING MODBUS PROTOCOL.....	102
8.	SCADA.....	106
8.1.	INDUSOFT	107
8.2.	CITECT	108
8.3.	IFIX	109
9.	TROUBLESHOOTING AND TECHNICAL SUPPORT	110
	APPENDIX A: DIMENSIONS.....	112
	APPENDIX B: MINIOS7 UTILITY.....	114
	APPENDIX C: MODBUS REGISTER TABLES.....	121
	APPENDIX D: MODBUS APPLICATION NOTES.....	136
	APPENDIX F: FRAME GROUND.....	146
	APPENDIX G: NODE INFORMATION AREA.....	147
	APPENDIX H: TECHNICAL SUPPORT.....	148

1. Introduction

The ET-7000 is a web-based Ethernet I/O module. It has a built-in web server that used for all configuration and I/O data monitoring and controlling using a regular web browser dynamically. No extra programming tools or HTML editor are needed. Thus users can easily and safely access the ET-7000 from anywhere at anytime all over the world.

In addition, the ET-7000 also supports Modbus/TCP protocol; it means that the ET-7000 can easily be integrated into any SCADA software environment based on the Modbus protocol.



The ET-7000 module is designed to use in industrial monitoring and measurement applications, so the hardware has been manufactured to survive in harsh and noisy environment. As a result, the module contains 2-way isolation against noise and surge signals, has a wide range power input (10 ~ 30 VDC) and can operating at temperature ranging from -25 ~ +75 °C.

Package Checklist

The package includes the following items:

- One ET-7000 hardware module
- One Quick Start Manual
- One software utility CD
- One screw driver

Note:

If any of these items are missing or damaged, contact the local distributors for more information. Save the shipping materials and cartons in case you need to ship the module/product in the future.

Release Notes:

It is recommended that the **release notes and README.TXT** files should be read before using the controller. The release notes are included in the shipping package and the README.TXT file can be found in the root directory of the enclosed CD. Some important information is provided in the release note and README.TXT file.

1.1. Features

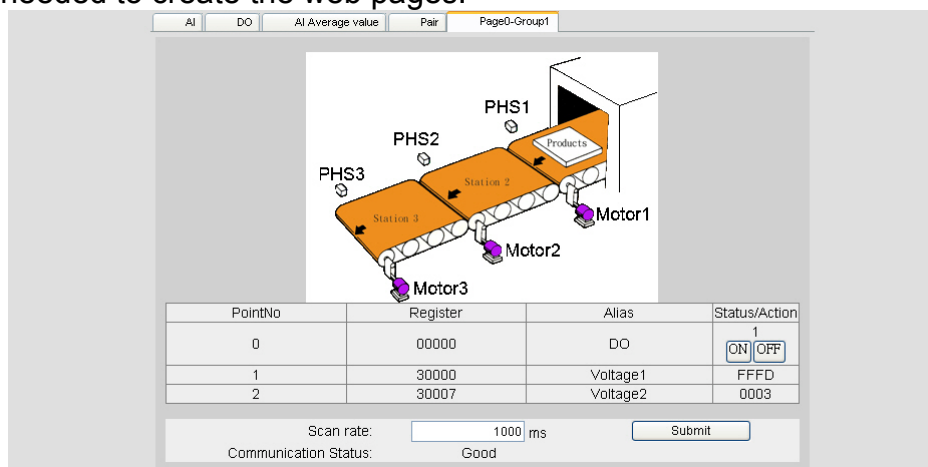
Built-in web server

Each ET-7000 module has a built-in web server that allows the user to easily configure, monitor and control the module from a remote location using a regular web browser.



Web HMI

The Web HMI function allows the user to create dynamic and attractive web pages to monitor and control the I/O points. The user can upload specific I/O layout pictures (bmp, jpg, gif format) and define a description for each I/O point. No HTML or Java skills are needed to create the web pages.



Communication Security

An Account and a password are needed when logging into the ET-7000 web server. An IP address filter is also included, which allows connections from specific IP

Chapter 1 Introduction

addresses.

Modbus protocol

- The Modbus/TCP slave function is for providing data to remote SCADA software on the Ethernet network.

Built-in Multi-function I/O

All Digital Output modules provide:

- Power on value (On boot up, the DO status is set to the Power-on value)
- Safe value (If Modbus/TCP communication is lost for a specified period, the DO status is set to the safe value)

All Analog Input modules provide:

- High/Low Alarm
- High/Low Latch value

All-in-one module

The various I/O components are mixed with multiple channels in a single module, which provides the most cost effective I/O usage and enhances performance of the I/O operations.

2-way isolated noise/surge protection

To protect the hardware from damage caused by noise and surge, the ET-7000 module is designed with isolation circuits for Ethernet, and I/O.

Built-in Dual Watchdog

The Dual Watchdog consists of the/a Module Watchdog and the/a Host Watchdog.

- The Module Watchdog is a built-in hardware circuit that can be used to monitor the operation of the module and will reset the CPU module if a failure occurs in either the hardware or the software.
- The Host Watchdog is a software function that can be used to monitor the operating status of the host, and is used to prevent network communication problems or host failures.

Automatic MDI / MDI-X crossover for plug-and-play

The RJ-45 port support automatic MDI/MDI-x that can automatically detect the type of connection to the Ethernet device without requiring special straight or crossover cables.

Ventilated housing designed to operate between -25 ~ +75°C

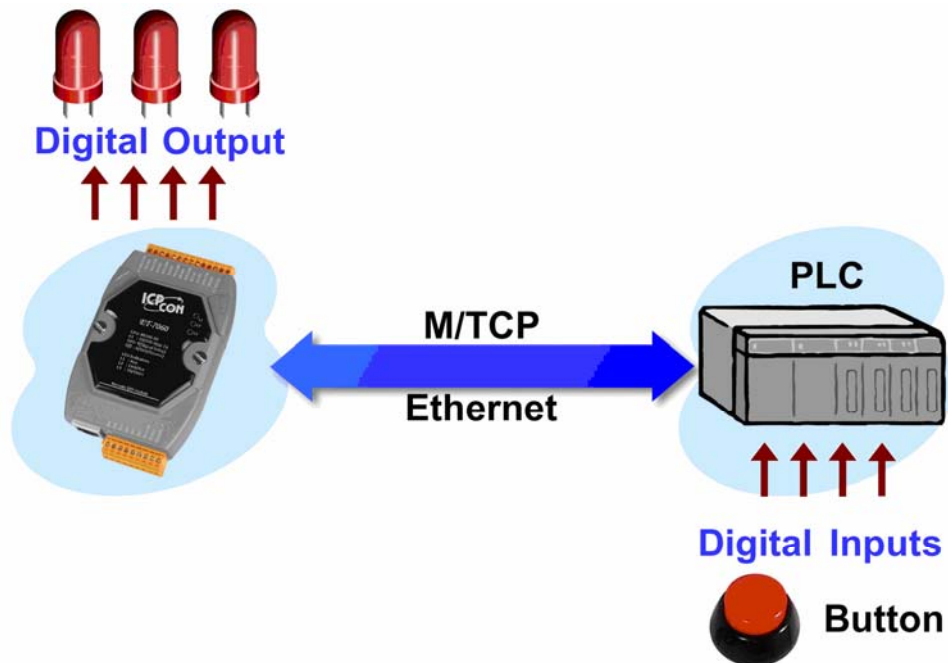
The ET-7000 is housed in a plastic-based shell/case with a column-like ventilator that helps to cool the working environment inside the shell/case and allows the ET-7000 to operate at temperatures ranging from -25°C and +75°C.

I/O Pair Connection

This function is used to create a DI to DO pair through the Ethernet. Once the

Chapter 1 Introduction

configuration is complete, the ET-7000 module can poll the status of remote DI (use the Modbus/TCP protocol) continuously and then write to the paired local DO channel in the background.



1.2. General Specifications

System	
CPU	80186-80 or compatible
EEPROM	16 KB
SRAM	512 KB
FLASH ROM	512 KB
Built-in Watchdog Timer	Yes
Communication Interface	
Ethernet Port	10/100Base-TX Ethernet Controller, RJ-45 Port
LED indicators	
System Run Indicator	Yes
Ethernet (Link/Active)	Yes
Ethernet (10/100M)	Yes
Isolation	
I/O Isolation	Dependent on the type of ET-7000 module. (Please refer to “ Sec 1.3 Module Selection ” for more detailed information)
Ethernet Isolation	1500 V _{DC}
Power	
Power requirements	+10 ~ +30 V _{DC} (non-regulated)
Power consumption	Dependent on the type of ET-7000 module. (Please refer to “ Sec 1.3 Module Selection ” for more detailed information)
General environment	
Operating temperature	-25 ~ +75 °C
Storage temperature	-30 ~ +80 °C
Relative humidity	5 ~ 90% RH, non-condensing
Mechanical	
Dimensions (W × H × D)	72 mm x 123 mm x 35 mm
Installation	DIN rail, wall or piggyback mounting
I/O Components	
	Dependent on the type of ET-7000 module, please refer to the next chapter for more detailed I/O specifications.

1.3. Module Selection

ET-7000 classification

ET - 7 X Y Z

ET: Ethernet communication interface

X: Number of the variance

Y: Function code

Z: Extension function code

Table 1-1 ET-7000 classification

X	Y	Z
Number of variance	1. AI module	4. Transmitter 5. RTD 6. Strain Gauge 7. Analog Input 8. Thermocouple
	2. AO module	1. Voltage output 2. Current output
	3. Reserved	
	4. DIO module	Number of variance
	5. DIO module	Number of variance
	6. DIO module with relay	Number of variance
	7. Multi-function	1. General purpose
	8. Counter / Frequency	Number of variance
	9. Motion	N: Number of axes

Released Module

Type	Module	Description
RTD	ET-7015	7-channel RTD Inputs with 3-wire RTD lead resistance elimination
Voltage and Current	ET-7017	4-channel isolated digital outputs and 8-channel differential analog inputs
	ET-7017-10	10-channel differential analog inputs or 20-channel single-ended analog inputs
Thermocouple	ET-7018Z	10-channel Thermocouple inputs and 6-channel isolated digital outputs

ET-7015

Layout and Pin Assignments

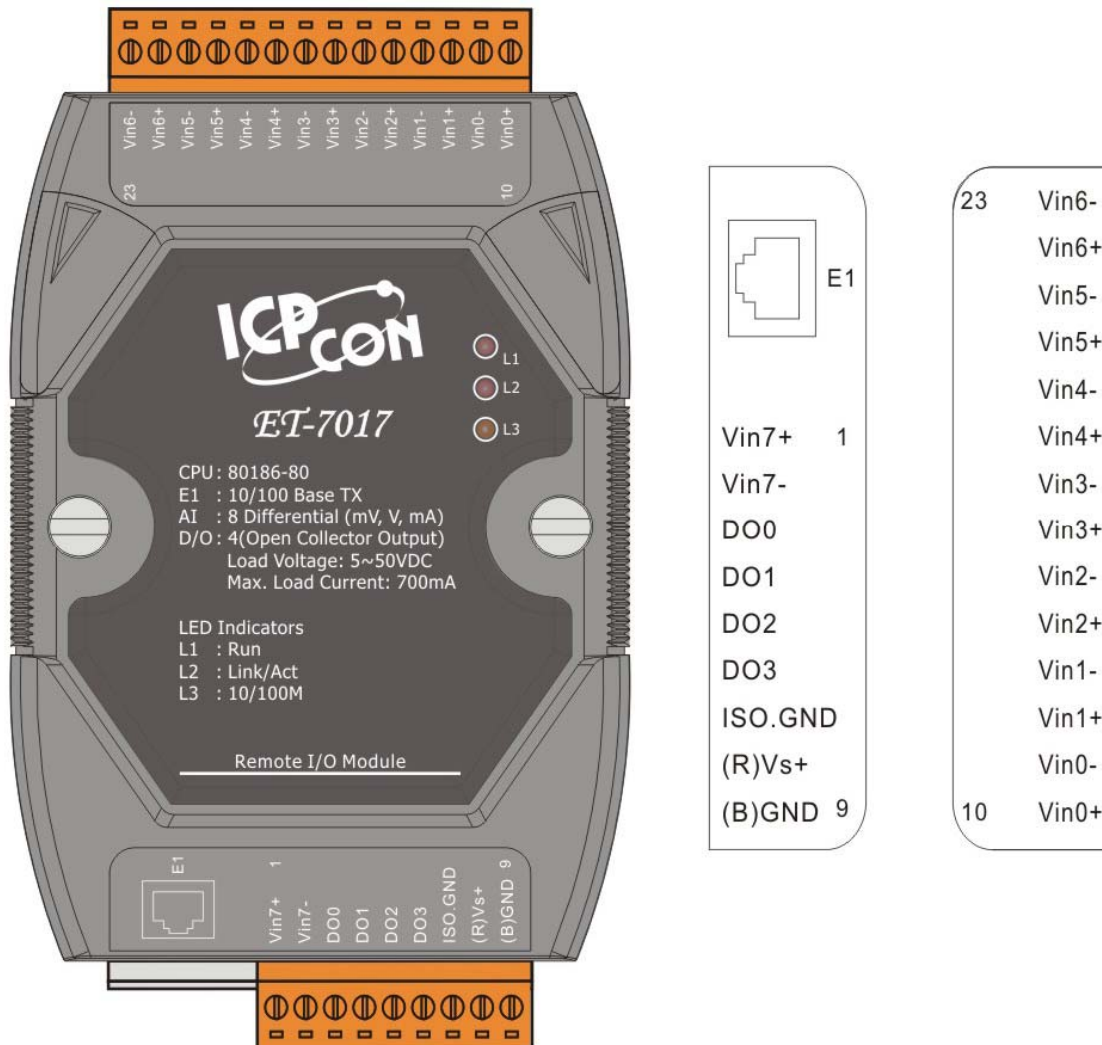


ET-7015 I/O Specifications:

Analog Input	
Input Channels	7 (Differential)
Input Type	RTD
Wire Connection	2/3 wire
RTD Type	Pt100, Pt1000, Ni120, Cu100, Cu1000
Resolution	16-bit
Sampling Rate	12 samples/ second total
Accuracy	+/-0.05%
-3dB Bandwidth	15.7 Hz
Zero drift	+/-0.5 $\mu\text{V}/^{\circ}\text{C}$
Span drift	+/-20 $\mu\text{V}/^{\circ}\text{C}$
Voltage Input Impedance	> 1 MOhm
Common Mode Rejection	150 dB
Normal Mode Rejection	100 dB
Open Wire Detection	Yes
Individual Channel Configurable	Yes
3-wire RTD lead resistance elimination	Yes
ESD Protection	4 kV Contact for each terminal, and 8 kV Air for random point
EFT Protection	4 kV for Power
Power Requirements	
Power consumption	0.1 A/24 V _{DC} Max. (non-regulated)

ET-7017

Layout and Pin Assignments



ET-7017 I/O Specifications:

Analog Input	
Input Channels	8 Differential
Input Type	+/-150 mV, +/-500 mV, +/-1 V, +/-5 V, +/-10 V +/-20 mA, 0~20 mA, 4~20 mA (jumper selectable)
Resolution	16-bit (Normal Mode) / 12-bit (Fast Mode)
Sampling Rate	10 samples/ second total (Normal Mode) / 50 samples/ second total (Fast Mode)
Accuracy	+/-0.1% (Normal Mode) / +/-0.5% (Fast Mode) or better
Bandwidth	15.7 Hz (Normal Mode) / 78. 7Hz (Fast Mode)
Zero drift	+/-20 $\mu\text{V}/^{\circ}\text{C}$
Span drift	+/-25 ppm/ $^{\circ}\text{C}$
Input Impedance	Voltage: 2 MOhm Current: 125 Ohm
Common Mode Rejection	86 dB min.
Normal Mode Rejection	100 dB
Over Voltage Protection	240 Vrms
ESD Protection	4 kV Contact for each terminal, and 8 kV Air for random point
EFT Protection	4 kV for Power
Digital Output	
Output Channels	4 (Sink)
Output Type	Isolated Open Collector
Max Load Current	700 mA/ channel
Load Voltage	5 ~ 50 V_{DC}
Power Requirements	
Power Consumption	0.10 A/24 V_{DC} Max.

ET-7017-10

Layout and Pin Assignments



ET-7017-10 I/O Specifications:

Analog Input	
Input Channels	10 differential or 20 single-ended (Note1), software selectable
Input Type	+/-150 mV, +/-500 mV, +/-1 V, +/-5 V, +/-10 V +/-20 mA, 0~20 mA, 4~20 mA (jumper selectable)
Resolution	16-bit (Normal Mode) / 12-bit (Fast Mode)
Sampling Rate	10 samples/ second total (Normal Mode) / 50 samples/ second total (Fast Mode)
Accuracy	+/-0.1% (Normal Mode) / +/-0.5% (Fast Mode) or better
Bandwidth	15.7 Hz (Normal Mode) / 78.7 Hz (Fast Mode)
Zero drift	+/-20 μ V/°C
Span drift	+/-25 ppm/°C
Input Impedance	Voltage: 2 MOhm (Differential), 1 MOhm (Single-ended) Current: 125 Ohm
Common Mode Rejection	86 dB min.
Normal Mode Rejection	100 dB
Over Voltage Protection	Differential: 240 Vrms, Single-ended: 150Vrms
ESD Protection	4 kV Contact for each terminal, and 8 kV Air for random point
EFT Protection	4 kV for Power
Power Requirements	
Power consumption	0.11 A/24 V _{DC} Max. (non-regulated)

*Note1: Single-Ended Mode is not available to current inputs.

Chapter 1 Introduction

ET-7018Z I/O Specifications:

Analog Input	
Input Channels	10 (Differential)
Input Type	+/-15 mV, +/-50 mV, +/-100 mV, +/-500 mV, +/-1 V, +/-2.5 V +/-20 mA, 0~20 mA, 4~20 mA (Requires Optional External 125 Ohm Resistor) Thermocouple (J, K, T, E, R, S, B, N, C, L, M, LDIN43710)
Resolution	16-bit
Sampling Rate	10 samples/ second total
Accuracy	+/-0.1% or better
-3dB Bandwidth	15.7 Hz
Zero drift	+/-0.5 $\mu\text{V}/^{\circ}\text{C}$
Span drift	+/-25 ppm/ $^{\circ}\text{C}$
Input Impedance	> 300K Ohm
Common Mode Rejection	150 dB min.
Normal Mode Rejection	100 dB
Open Wire Detection	Yes
Individual Channel Configurable	Yes
Over Voltage Protection	240 Vrms
ESD Protection	4 kV Contact for each terminal, and 8 kV Air for random point
EFT Protection	4 kV for Power
Digital Output	
Output Channels	6 (Sink)
Output Type	Isolated Open-Collector
Max Load Current	700mA/ channel
Load Voltage	5 ~ 50 V _{DC}
DB-1820	
Wire Strip Length	4~5 mm
Wire Range	16~24 AWG
Power Requirements	
Power consumption	0.09 A/24 V _{DC} (non-regulated)

1.4. View of the ET-7000

Front Panel Description



Table 1-2 LED Indicators

Name	LED Action	Function
Run	Flashing	Firmware is running
LINK/ACT	ON	Ethernet link detected
	OFF	No Ethernet link detected
	Flashing Green	Ethernet packet received
10/100M	OFF	Speed 10 Mbps
	Orange	Speed 100 Mbps



Note:

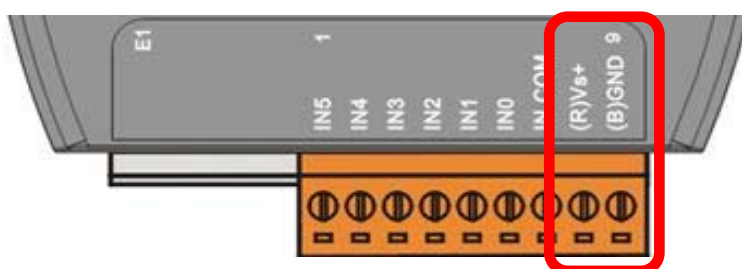
If the Run LED does not display the information as above, the following steps should be taken:

- Switch the Power off
- Check that the Init/Normal switch is in the **Normal** position. (Refer to **Back Panel Description**)
- Switch the Power on and double-check the LED indicators.

J1 Connector

Refer to **Sec.1.3 Module Selection** for more details regarding the pin assignments of the J1 Connector for all types of ET-7000 series modules.

J2 Connector

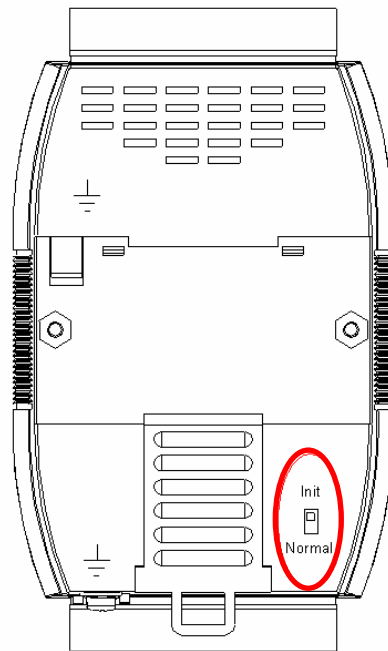


The definition of pin8 and pin9 applies to all types of the ET-7000 modules. The definition of the other pins is dependent on the particular ET-7000 modules.

Table 1-3 J2 Connector

Pin number	Name	Function
8	+VS	10 ~ 30 V _{DC} power input
9	GND	Ground connection

Back Panel Description



INIT Switch

Init/Normal switch

Init mode: MiniOS7 configuration mode

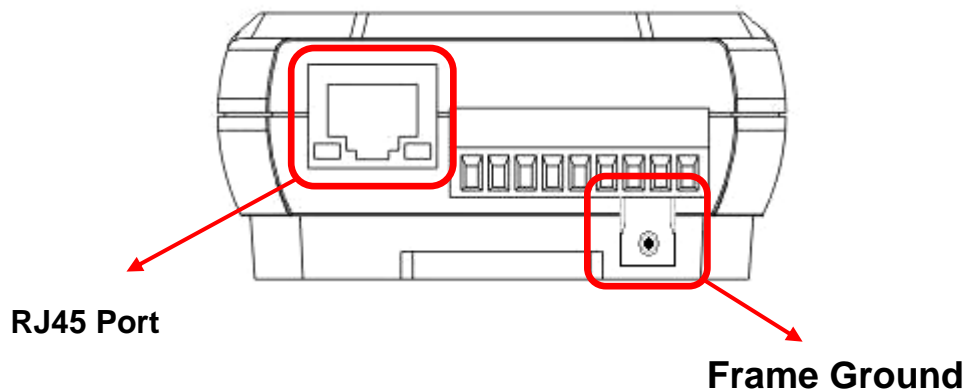
Normal mode: Firmware running mode



In the ET-7000 series, the Switch is ALWAYS in the Normal position. Only when updating the ET-7000 firmware or OS, the switch can be moved from the Normal position to the Init position.

Move the Switch to the Normal position after the update is complete.

Bottom Panel Description



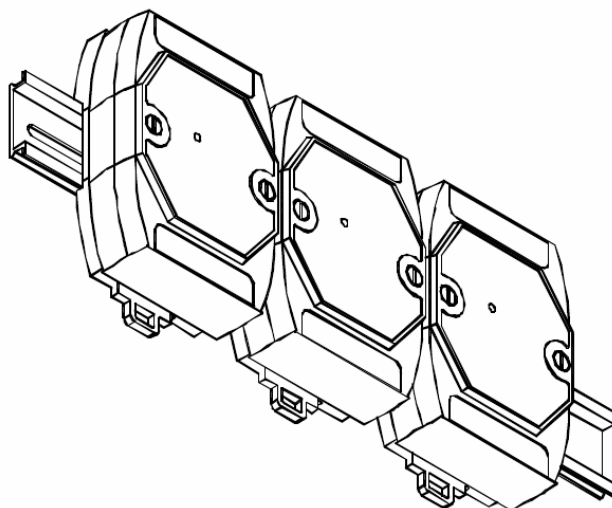
Note:

Appendix F describes how to connect the Frame Ground to the ET-7000 series

1.5. ET-7000 installation

1.5.1. Mounting the ET-7000

DIN Rail Mounting



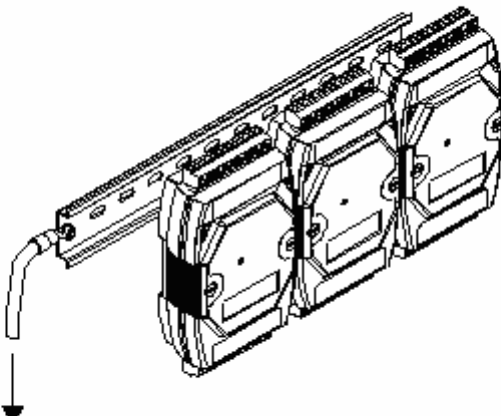
There are three new DIN rail models available. Each is made of stainless steel, which is stronger than those made of aluminum. There is a screw at one end and a ring terminal is included so that it can be easily connected to the earth ground. The three new DIN rail models are as follows.

Part number	Max number of modules	Dimensions
DRS-360	5	360mm x 35mm

A perspective line drawing of a DIN rail with a cable connected to a ring terminal. An arrow points from the text 'to earth ground' to the ring terminal. The rail is shown with several modules mounted on it.

Chapter 1 Introduction

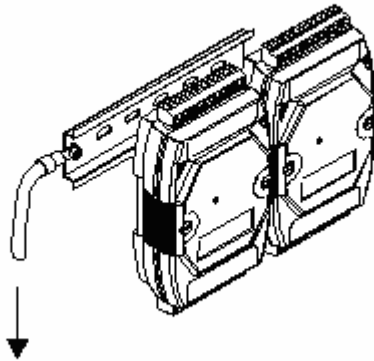
Part number	Max number of modules	Dimensions
DRS-240	3	240mm x 35mm



The diagram shows three DRS-240 modules mounted on a common rail. A cable is connected to the side of the modules, and an arrow points from the cable to the text "to earth ground".

to earth ground

Part number	Max number of modules	Dimensions
DRS-125	2	125mm x 35mm

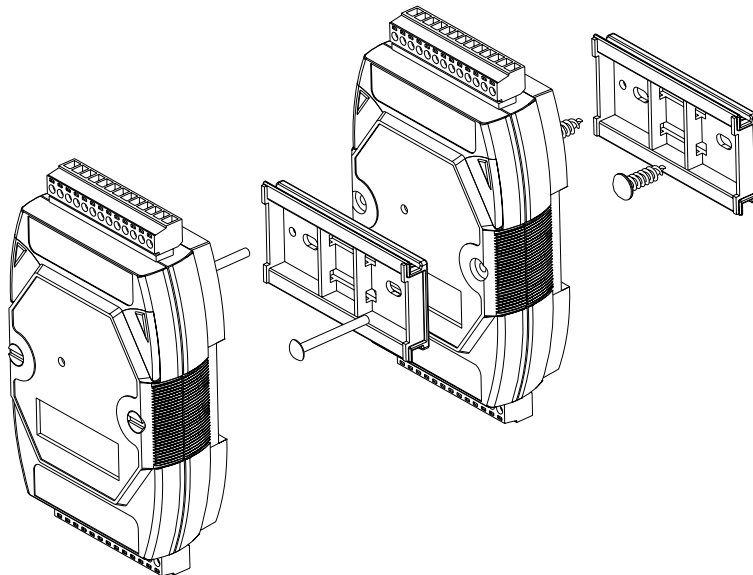


The diagram shows two DRS-125 modules mounted on a common rail. A cable is connected to the side of the modules, and an arrow points from the cable to the text "to earth ground".

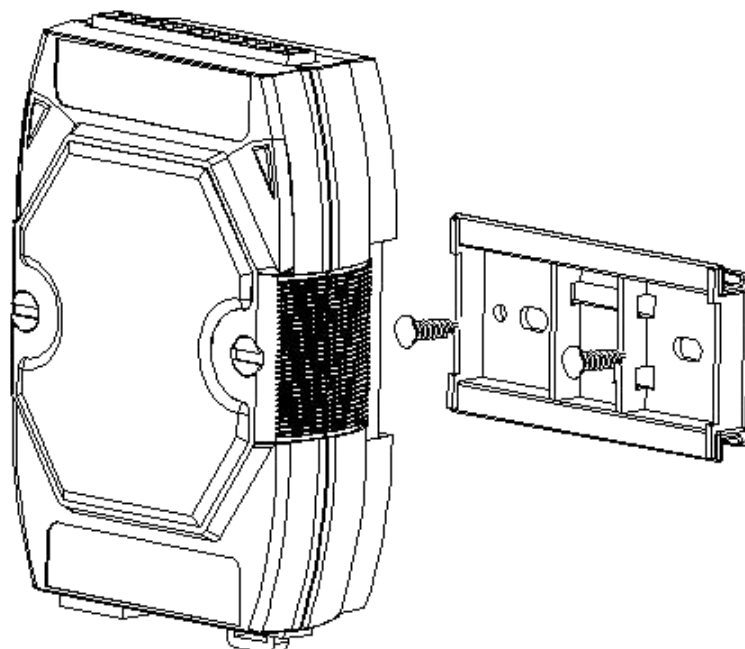
to earth ground

Note: The recommended wire to connect to the earth ground is 16 – 14 AWG wire.

Piggyback Mounting



Wall Mounting

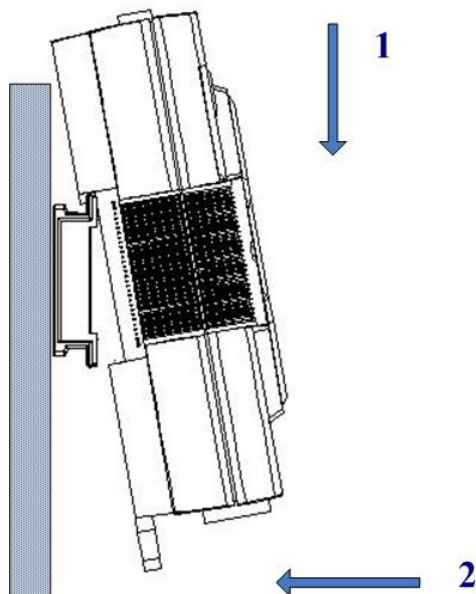


Chapter 1 Introduction

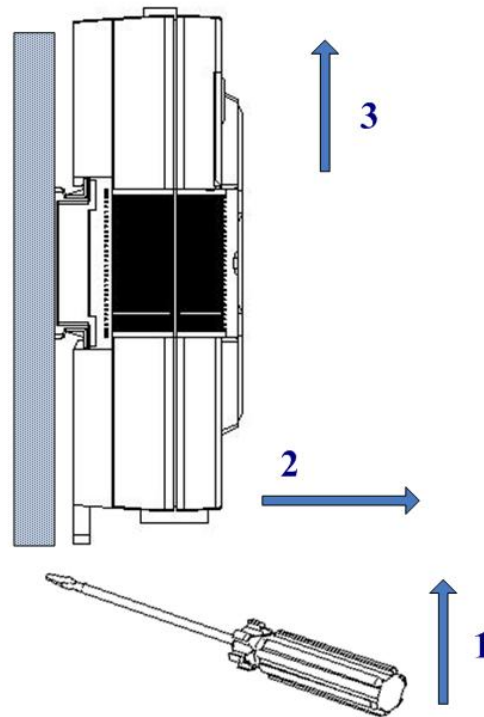
Snap the ET-7000 onto the DIN-rail (refer to the Snap On picture below)

Snap the ET-7000 off from the DIN-rail (refer to the Snap Off picture below)

Snap On



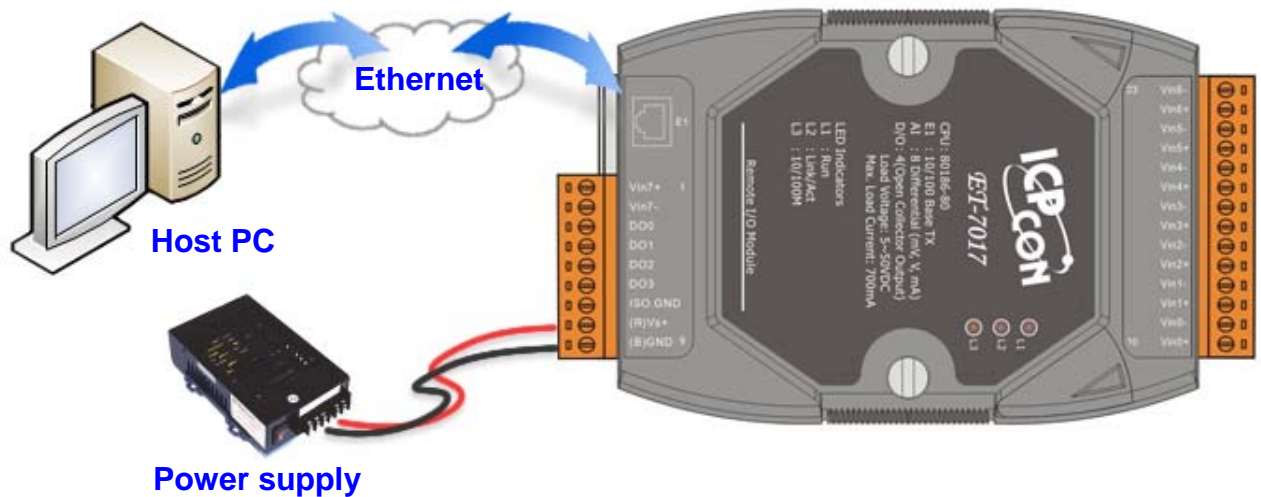
Snap Off



1.5.2. Connecting the Hardware

Step 1: Connect the Ethernet cable between the ET-7000 and the Host PC. Please refer to the **Ethernet cable wiring** section at the next page.

Step 2: Apply the power (+Vs, GND) in a range from 10 to 30 V_{DC} to the ET-7000.



Step 3: Check that the “RUN” LED (L1) on the ET-7000 is periodically ON for 0.5 seconds and then OFF for 0.5 seconds.

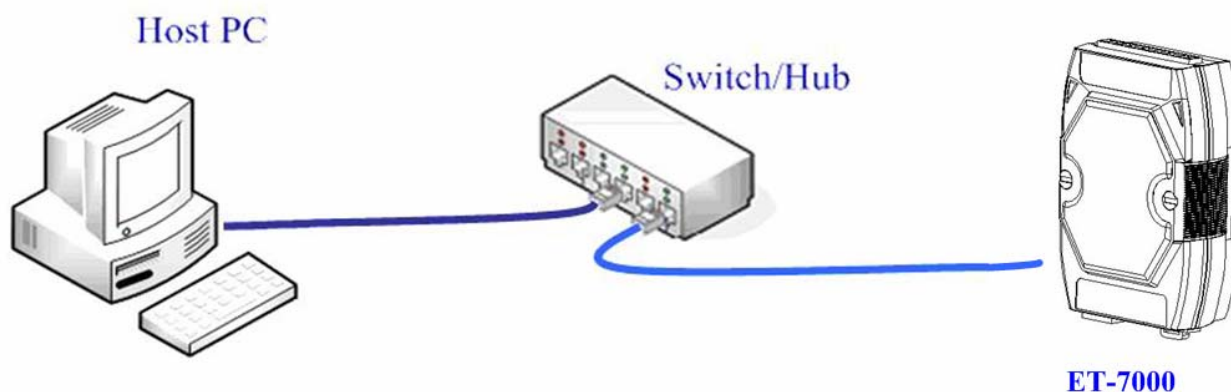


Notes:

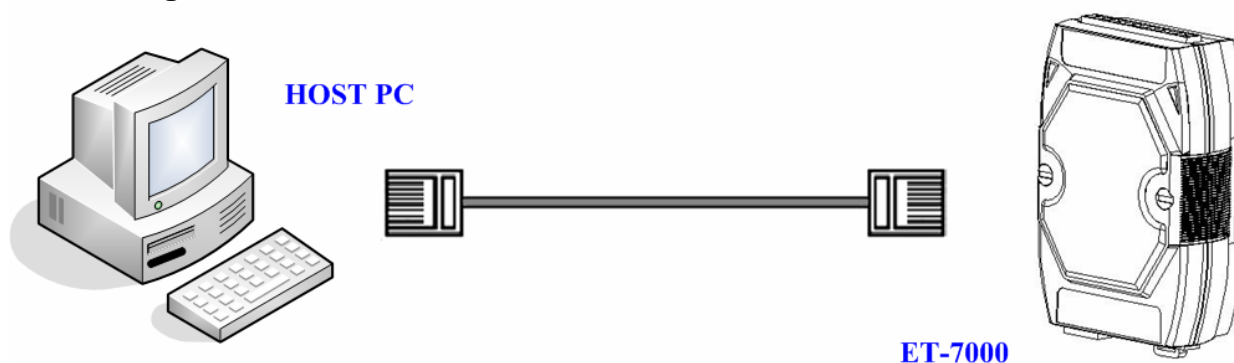
In ET-7000 series modules, V+ is connected to **Pin 8** of the J2 connector, and GND is connected to **Pin 9** of the J2 connector.

1.5.3. Ethernet cable wiring

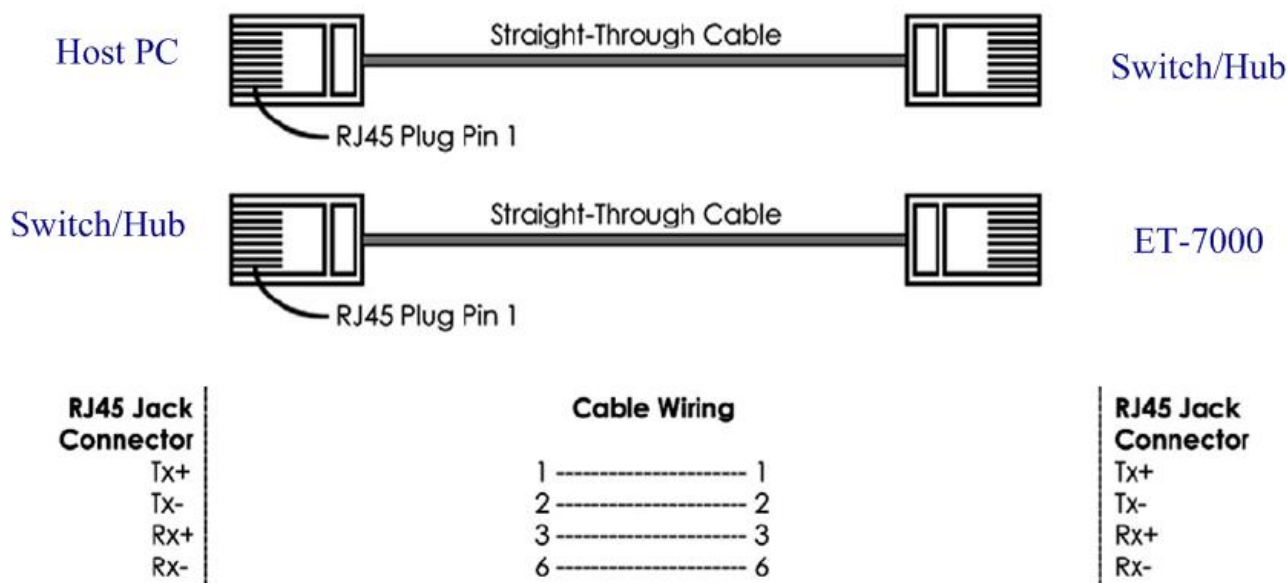
Connecting the ET-7000 to Switch or Hub



Connecting the ET-7000 to a Host PC



As a result of the automatic MDI / MDI-X crossover for plug-and-play on the ET-7000 RJ45 port, there is no need to a crossover cable to connect the ET-7000 to the Host PC, and only a general straight-through cable is needed to make the connection. The straight-through cable is shown as follows:



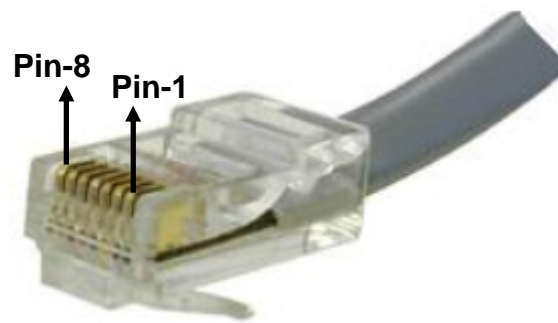

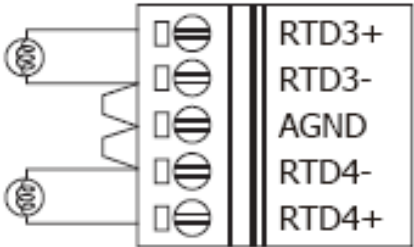

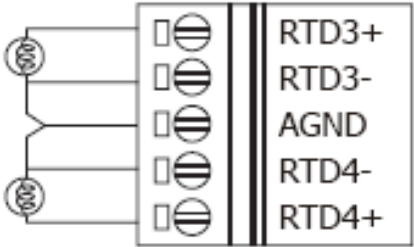


Table 1-4 RJ-45 Wiring Standards

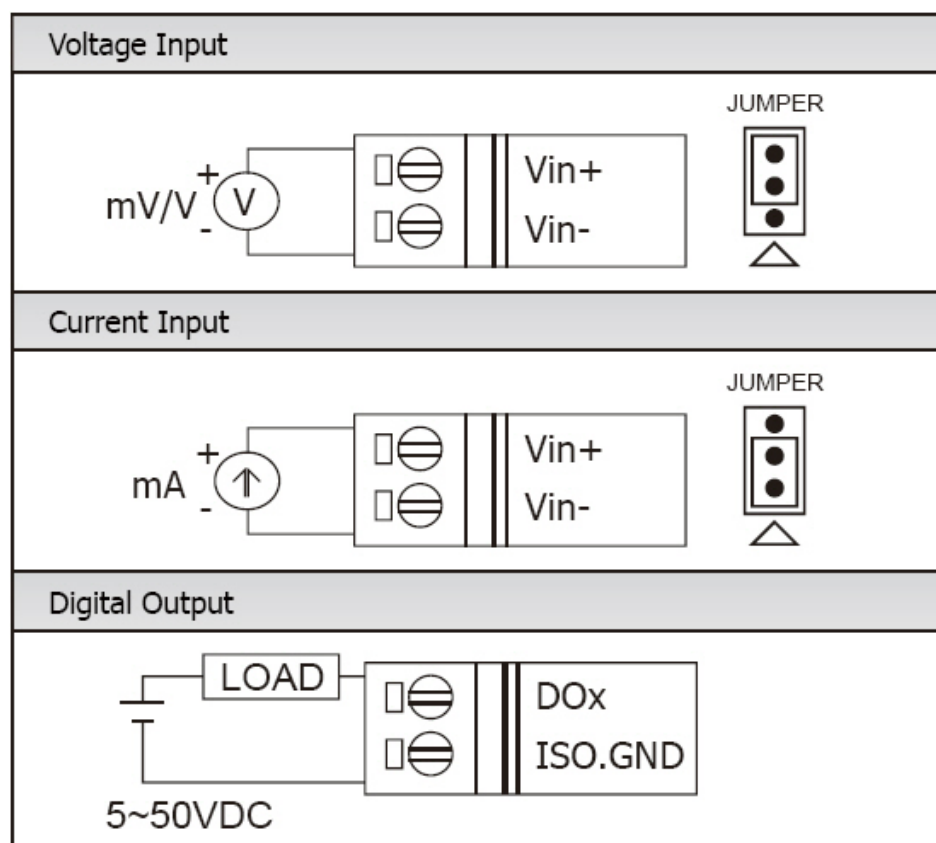
Pin Number	Signal	Function
1	Tx+	Transmit Data +
2	Tx-	Transmit Data -
3	Rx+	Receive Data +
4	N/A	Not Used
5	N/A	Not Used
6	Rx-	Receive Data -
7	N/A	Not Used
8	N/A	Not Used

1.6. I/O wiring connection

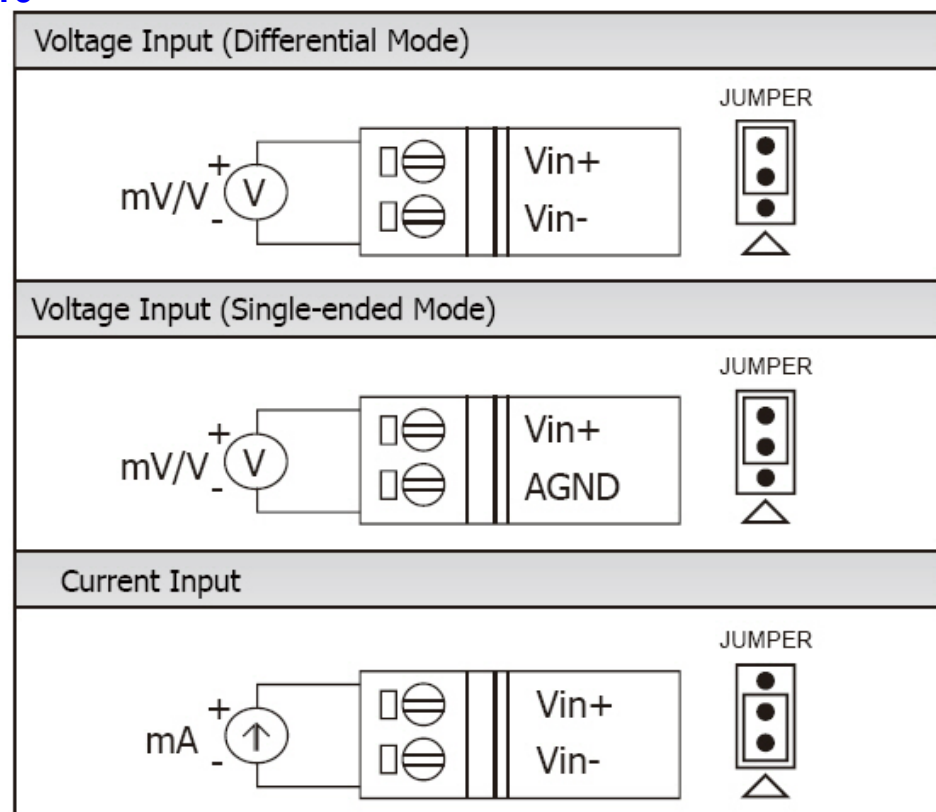
ET-7015

	CH0, 1, 2, 5 and 6	CH3 and CH4
2-Wire of RTD		
3-Wire of RTD		

ET-7017



ET-7017-10



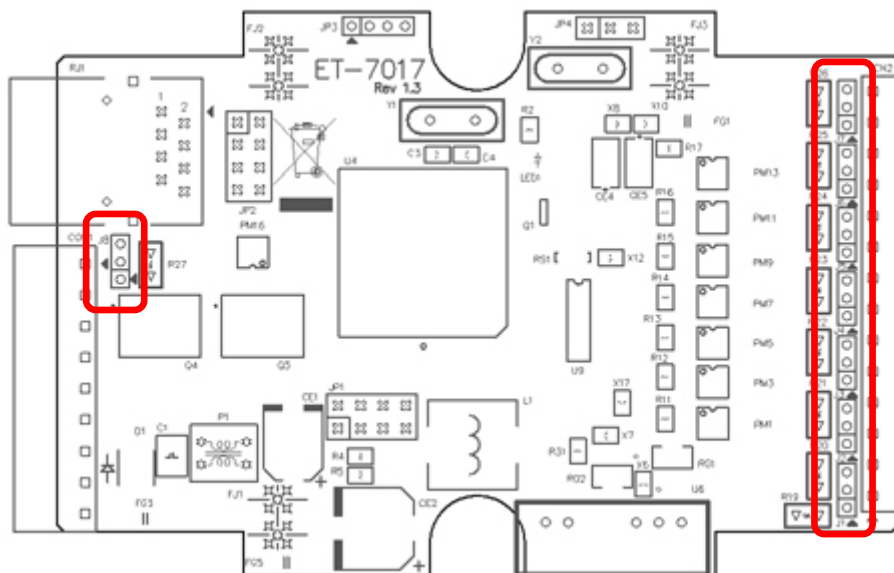
Chapter 1 Introduction

ET-7017 and ET-7017-10 Jumper Settings

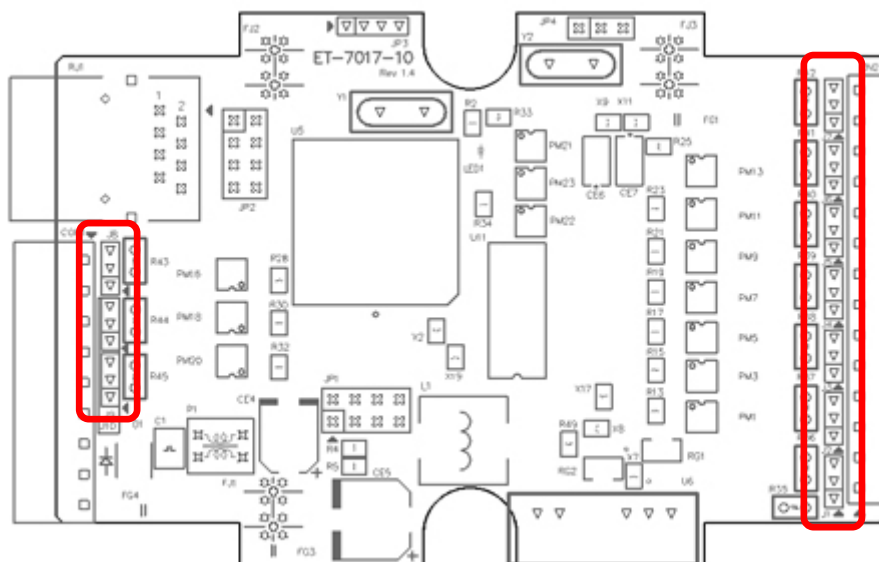
The ET-7017 and ET-7017-10 modules can accept voltage inputs and current inputs. No external resistor required but the corresponding jumper must be shorted.

The position of the jumpers is shown in the figure below.

ET-7017:

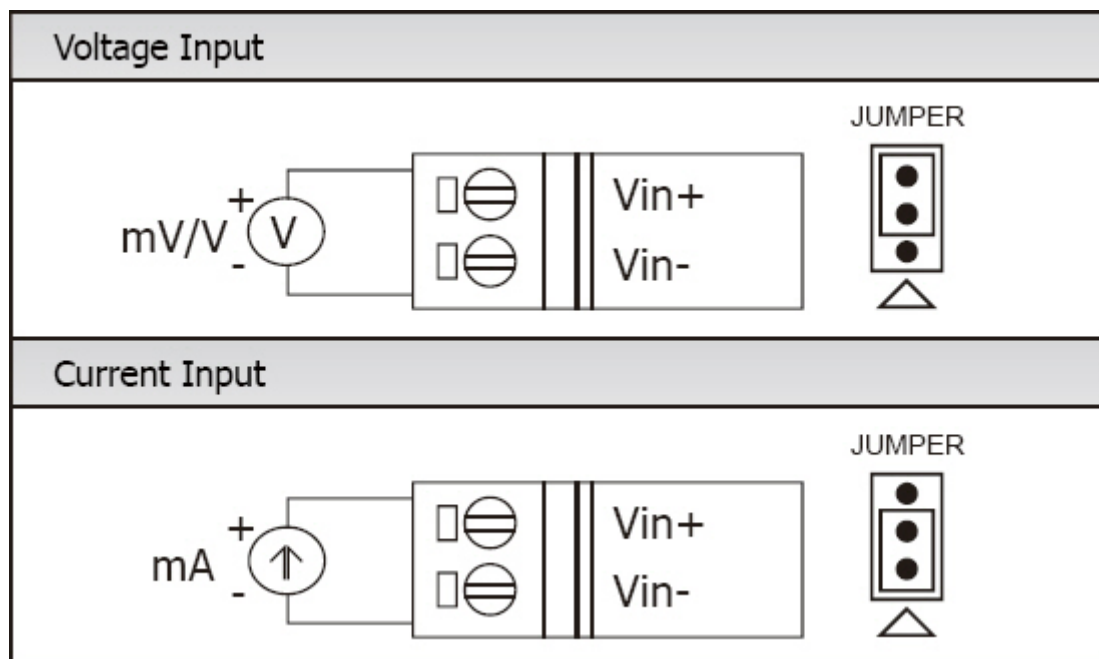


ET-7017-10:



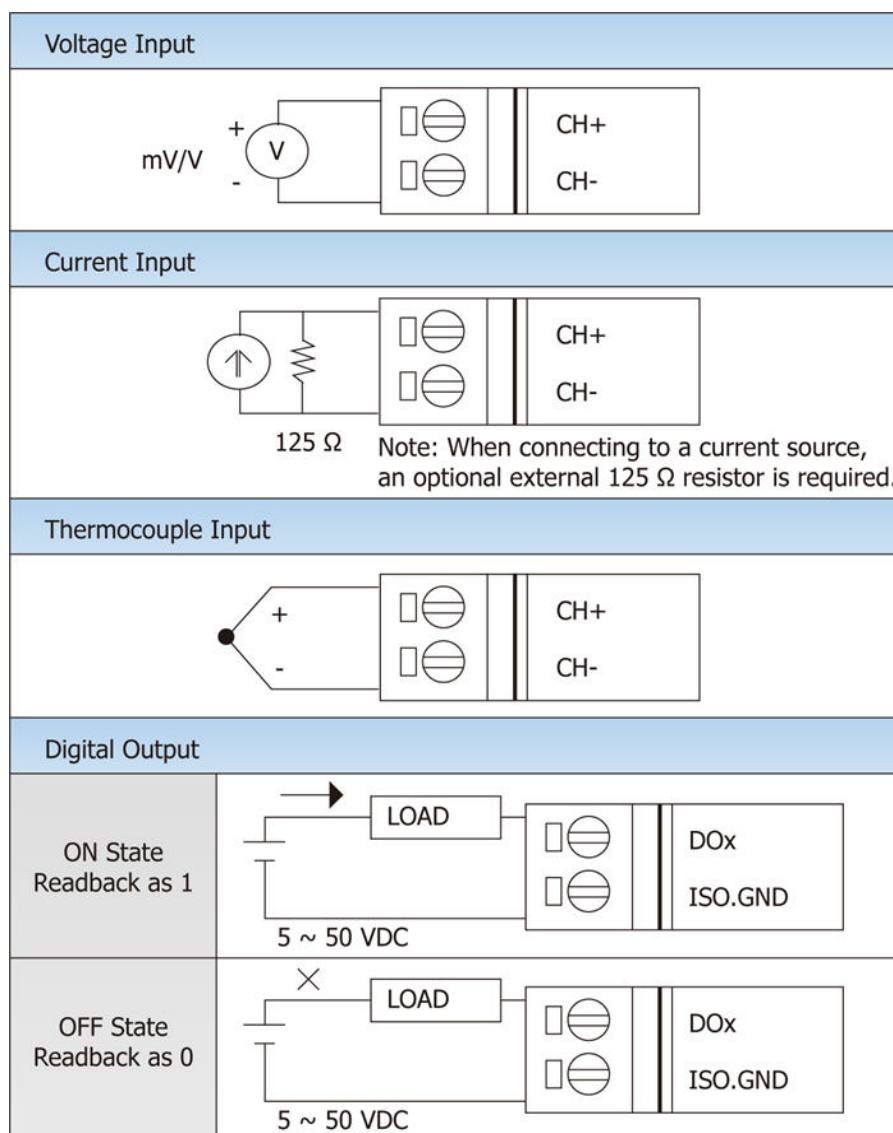
Chapter 1 Introduction

The following figure shows the jumper settings.



Notes:

To access the jumpers, the cover must be opened.



1.7. Default Settings

ET-7015:

Module address	01
AI type	Type 20, +/- 100 °C, Pt 100, $\alpha=0.00385$
AI data format	Hex format
AI enable	ON
AI temperature offset	0
AI resistance offset	0
Filter setting	60Hz

ET-7017 and the ET-7017-10:

Module address	01
AI type	Type 08, -10V to 10V
AI data format	Hex format
Filter setting	60Hz
Input mode	Normal mode

ET-7018Z:

Module address	01
AI type	Type 05, -2.5V to 2.5V
AI data format	Hex format
Filter setting	60Hz
Input mode	Normal mode

1.8. Calibration

It is not recommended that calibration be performed until the process is fully understood.

1.8.1. The calibration procedure for ET-7015:

For the ET-7015, each channel should be calibrated separately and only the channel being calibrated should be enabled during calibration.

1. Warm up the module for at least 30 minutes.
2. Enable the channel you want to calibrate and disable other channels.
3. Set the type code to the type you wish to calibrate.
4. Enable calibration
5. Connect the zero calibration resistor to **the enabled channel**.
6. Send zero calibration command.
7. Connect the span calibration resistor to **the enabled channel**
8. Send the span calibration command.
9. Disable calibration

Table 1.8.1 Modbus address for calibration:

Register	Points	Description	Access Type
00830	1	Enable/Disable Calibration 0=Disabled 1=Enabled	R/W
00831	1	Zero calibration command of ch0, 1 = run.	W (Pulse)
00832	1	Span calibration command of ch0, 1 = run	W (Pulse)
00833	1	Zero calibration command of ch1, 1 = run.	W (Pulse)
00834	1	Span calibration command of ch1, 1 = run	W (Pulse)
00835	1	Zero calibration command of ch2, 1 = run.	W (Pulse)
00836	1	Span calibration command of ch2, 1 = run	W (Pulse)
00837	1	Zero calibration command of ch3, 1 = run.	W (Pulse)
00838	1	Span calibration command of ch3, 1 = run	W (Pulse)
00839	1	Zero calibration command of ch4, 1 = run.	W (Pulse)
00840	1	Span calibration command of ch4, 1 = run	W (Pulse)
00841	1	Zero calibration command of ch5, 1 = run.	W (Pulse)
00842	1	Span calibration command of ch5, 1 = run	W (Pulse)
00843	1	Zero calibration command of ch6, 1 = run.	W (Pulse)
00844	1	Span calibration command of ch6, 1 = run	W (Pulse)

Chapter 1 Introduction

Table 1.8.2 Calibration resistors for the ET-7015:

Type code	Zero Calibration Resistor	Span Calibration Resistor
2B	0 Ohm	200 Ohm
20	0 Ohm	375 Ohm
2A	0 Ohm	3200 Ohm

Note:

1. Types 21 to 29, 2E, 2F, 80 81 and 83 use the same calibration parameters as type 20.
2. Type 2C and 82 uses the same calibration parameters as type 2B.
3. Type 2D uses the same calibration parameters as type 2A.

Table 1.8.3 RTD Input Type

Type Code	RTD Input Type	Temperature Range °C
20	Platinum 100, $\alpha = 0.00385$	-100 ~ 100
21	Platinum 100, $\alpha = 0.00385$	0 ~ 100
22	Platinum 100, $\alpha = 0.00385$	0 ~ 200
23	Platinum 100, $\alpha = 0.00385$	0 ~ 600
24	Platinum 100, $\alpha = 0.003916$	-100 ~ 100
25	Platinum 100, $\alpha = 0.003916$	0 ~ 100
26	Platinum 100, $\alpha = 0.003916$	0 ~ 200
27	Platinum 100, $\alpha = 0.003916$	0 ~ 600
28	Nickel 120	-80 ~ 100
29	Nickel 120	0 ~ 100
2A	Platinum 1000, $\alpha = 0.00385$	-200 ~ 600
2B	Cu 100 @ 0°C, $\alpha = 0.00421$	-20 ~ 150
2C	Cu 100 @ 25°C, $\alpha = 0.00427$	0 ~ 200
2D	Cu 1000 @ 0°C, $\alpha = 0.00421$	-20 ~ 150
2E	Platinum 100, $\alpha = 0.00385$	-200 ~ 200
2F	Platinum 100, $\alpha = 0.003916$	-200 ~ 200
80	Platinum 100, $\alpha = 0.00385$	-200 ~ 600
81	Platinum 100, $\alpha = 0.003916$	-200 ~ 600
82	Cu 50 @ 0°C	-50 ~ 150
83	Nickel 100	-60 ~ 180

Chapter 1 Introduction

Table 1.8.4 RTD Input Type and Data Format

Type Code	RTD Type	Data Format	+F.S	-F.S
20	Platinum 100 $\alpha = 0.00385$ -100 ~ 100°C	Engineering unit	+10000	-10000
		2's comp HEX	7FFF	8000
		Ohm	+138.50	+060.60
21	Platinum 100 $\alpha = 0.00385$ 0 ~ 100°C	Engineering unit	+10000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+138.50	+100.00
22	Platinum 100 $\alpha = 0.00385$ 0 ~ 200°C	Engineering unit	+20000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+175.84	+100.00
23	Platinum 100 $\alpha = 0.00385$ 0 ~ 600°C	Engineering unit	+60000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+313.59	+100.00
24	Platinum 100 $\alpha = 0.003916$ -100 ~ 100°C	Engineering unit	+10000	-10000
		2's comp HEX	7FFF	8000
		Ohm	+139.16	+060.60
25	Platinum 100 $\alpha = 0.003916$ 0 ~ 100°C	Engineering unit	+10000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+139.16	+100.00
26	Platinum 100 $\alpha = 0.003916$ 0 ~ 200°C	Engineering unit	+20000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+177.14	+100.00
27	Platinum 100 $\alpha = 0.003916$ 0 ~ 600°C	Engineering unit	+60000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+317.28	+100.00
28	Nickel 120 -80 ~ 100°C	Engineering unit	+10000	-08000
		2's comp HEX	7FFF	999A
		Ohm	+200.64	+066.60
29	Nickel 120 0 ~ 100°C	Engineering unit	+10000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+20064	+12060
2A	Platinum 1000 $\alpha = 0.00385$ -200 ~ 600°C	Engineering unit	+600.00	-200.00
		2's comp HEX	7FFF	D556
		Ohm	+3137.1	+0185.2

Chapter 1 Introduction

Type Code	RTD Type	Data Format	+F.S	-F.S
2B	Cu 100 $\alpha = 0.00421$ -20 ~ 150°C	Engineering unit	+15000	-02000
		2's comp HEX	7FFF	EEEF
		Ohm	+163.17	+091.56
2C	Cu 100 $\alpha = 0.00427$ 0 ~ 200°C	Engineering unit	+20000	+00000
		2's comp HEX	7FFF	0000
		Ohm	+167.75	+090.34
2D	Cu 1000 $\alpha = 0.00421$ -20 ~ 150°C	Engineering unit	+15000	-02000
		2's comp HEX	7FFF	EEEF
		Ohm	+1631.7	+0915.6
2E	Platinum 100 $\alpha = 0.00385$ -200 ~ 200°C	Engineering unit	+20000	-20000
		2's comp HEX	7FFF	8000
		Ohm	+175.84	+018.49
2F	Platinum 100 $\alpha = 0.003916$ -200 ~ 200°C	Engineering unit	+20000	-20000
		2's comp HEX	7FFF	8000
		Ohm	+177.14	+017.14
80	Platinum 100 $\alpha = 0.00385$ -200 ~ 600°C	Engineering unit	+60000	-20000
		2's comp HEX	7FFF	D556
		Ohm	+313.59	+018.49
81	Platinum 100 $\alpha = 0.003916$ -200 ~ 600°C	Engineering unit	+60000	-20000
		2's comp HEX	7FFF	D556
		Ohm	+317.28	+017.14
82	Cu 50 -50 ~ 150°C	Engineering unit	+15000	-05000
		2's comp HEX	7FFF	D556
		Ohms	+082.13	+039.24
83	Nickel 100 -60 ~ 180°C	Engineering unit	+18000	-06000
		2's comp HEX	7FFF	D556
		Ohms	+223.10	+069.50

Chapter 1 Introduction

It is not recommended that calibration be performed until the process is fully understood.

1.8.2. The calibration procedure for ET-7017 and ET-7017-10:

1. Warm up the module for at least 30 minutes.
2. Set the type code to the type you want to calibrate.
3. Enable calibration.
4. Apply the zero calibration voltage/current to **channel 0**.
5. Enable the zero calibration register.
6. Apply the span calibration voltage/current to **channels 0**.
7. Enable the span calibration register.
8. Disable calibration.

Table 1.8.5 Modbus address for calibration:

Register	Points	Description	Access Type
00830	1	Enable/Disable Calibration 0=Disabled 1=Enabled	R/W
00831	1	Performs a zero calibration, 1 = run.	W (Pulse)
00832	1	Performs a span calibration, 1 = run.	W (Pulse)

Table 1.8.6 Calibration voltage/current used by the ET-7017 and ET-7017-10 series:

Type code	08	09	0A	0B	0C	0D
Zero Input	0V	0V	0V	0mV	0mV	0mA
Span Input	+10V	+5V	+1V	+500mV	+150mV	+20mA

Chapter 1 Introduction

Table 1.8.7 Analog Input Type

Type Code	Analog Input Type	Range
07		4 mA ~ 20 mA
08	+/-10 V	-10 V ~ 10 V
09	+/-5 V	-5 V ~ 5 V
0A	+/-1 V	-1 V ~ 1 V
0B	+/-500 mV	-500 mV ~ 500 mV
0C	+/-150 mV	-150 mV ~ 150 mV
0D	+/-20 mV	-20 mV ~ 20 mV
1A		0 ~ 20 mA

Table 1.8.8 Analog Input Type and Data Format

Type Code	Input Type	Data Format	+F.S	-F.S
07	4mA ~ 20mA	Engineering format	20000	4000
		2's comp HEX	7FFF	8000
08	+/-10V	Engineering format	10000	-10000
		2's comp HEX	7FFF	8000
09	+/-5V	Engineering format	5000	-5000
		2's comp HEX	7FFF	8000
0A	+/-1V	Engineering format	10000	10000
		2's comp HEX	7FFF	8000
0B	+/-500mV	Engineering format	5000	-5000
		2's comp HEX	7FFF	8000
0C	+/-150mV	Engineering format	15000	15000
		2's comp HEX	7FFF	8000
0D	+/-20mV	Engineering format	20000	2000
		2's comp HEX	7FFF	8000
1A	0 ~ 20mA	Engineering format	0	20000
		2's comp HEX	7FFF	8000

Chapter 1 Introduction

It is not recommended that calibration be performed until the process is fully understood.

1.8.3. The calibration procedure for ET-7018Z:

1. Warm up the module for at least 30 minutes.
2. Enable **channel 0** and disable the other channels.
3. Set the type code of channel 0 to the type you want to calibrate.
9. Enable calibration.
10. Apply the zero calibration voltage/current to **channel 0**.
11. Enable the zero calibration register.
12. Apply the span calibration voltage/current to **channels 0**.
13. Enable the span calibration register.
14. Disable calibration.

Table 1.8.9 Modbus address for calibration:

Register	Points	Description	Access Type
00830	1	Enable/Disable Calibration 0=Disabled 1=Enabled	R/W
00831	1	Performs a zero calibration, 1 = run.	W (Pulse)
00832	1	Performs a span calibration, 1 = run.	W (Pulse)

Table 1.8.10 Calibration voltage/current used by the ET-7018Z series:

Type code	00	01	02	03	04	05	06
Zero Input	0mV	0mV	0mV	0mV	0V	0mV	0mA
Span Input	+15mV	+50mV	+100mV	+500mV	+1V	+2.5V	+20mA

Chapter 1 Introduction

Table 1.8.11 Analog Input Type

Type Code	Analog Input Type	Range
00	+/-15 mV	-15 mV ~ 15 mV
01	+/-50 mV	-50 mV ~ 50 mV
02	+/-100 mV	-100 mV ~ 100 mV
03	+/-500 mV	-500 mV ~ 500 mV
04	+/-1 V	-1 V ~ 1 V
05	+/-2.5 V	-2.5 V ~ 2.5 V
06	+/-20 mV	-20 mV ~ 20 mV
07	+4 to +20 mA	4 mA ~ 20 mA
0E	Type J Thermocouple	-210 °C ~ 760 °C
0F	Type K Thermocouple	-270 °C ~ 1372 °C
10	Type T Thermocouple	-270 °C ~ 400 °C
11	Type E Thermocouple	-270 °C ~ 1000 °C
12	Type R Thermocouple	0 °C ~ 1768 °C
13	Type S Thermocouple	0 °C ~ 1768 °C
14	Type B Thermocouple	0 °C ~ 1820 °C
15	Type N Thermocouple	-270 °C ~ 1300 °C
16	Type C Thermocouple	0 °C ~ 2320 °C
17	Type L Thermocouple	-200 °C ~ 800 °C
18	Type M Thermocouple	-200 °C ~ 100 °C
19	Type L DIN43710 Thermocouple	-200 °C ~ 900 °C
1A	0 to +20mA	0 mA ~ 20 mA

Table 1.8.12 Analog Input Type and Data Format

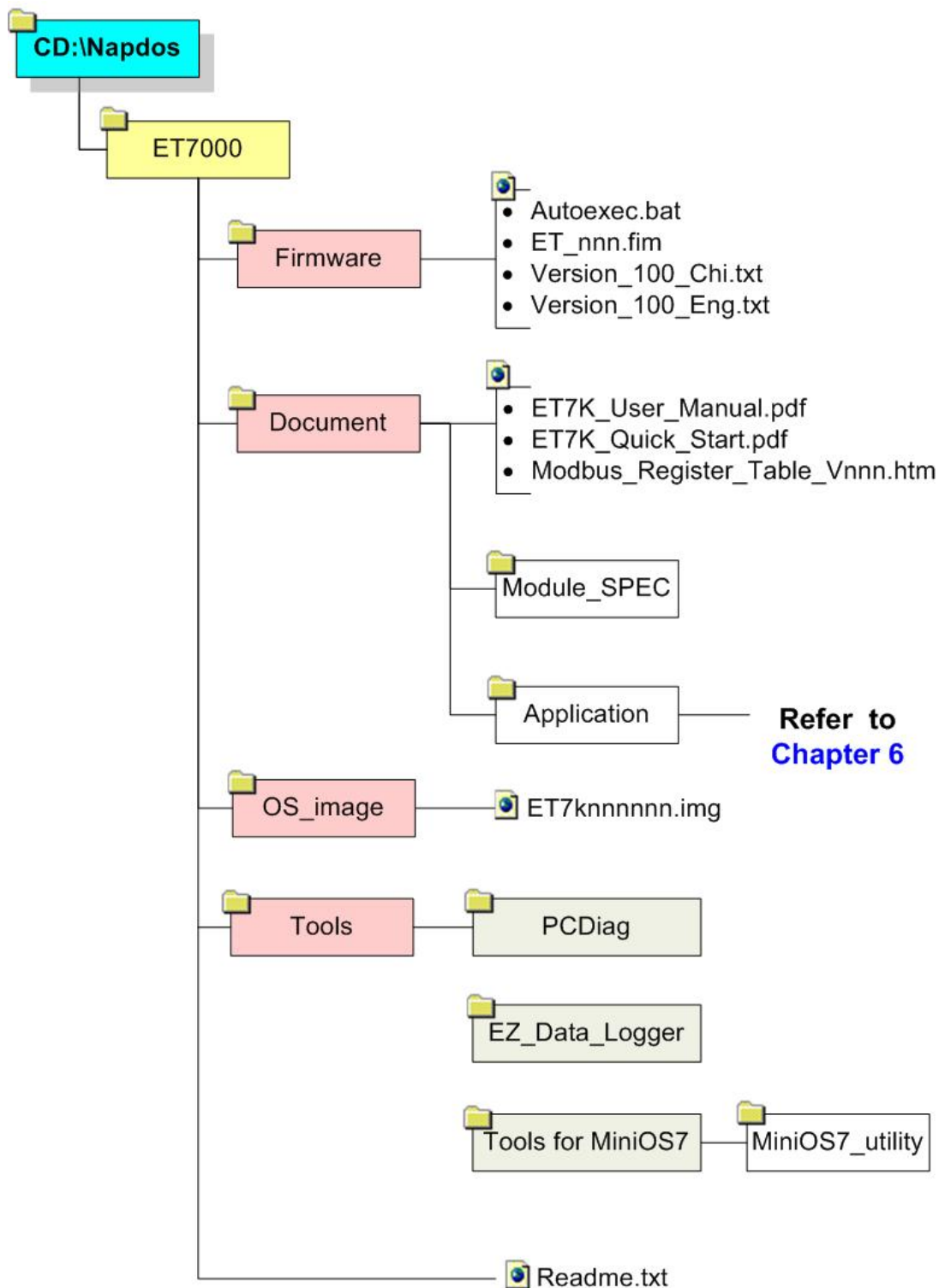
Type Code	Input Type	Data Format	+F.S	-F.S
00	+/-15 mV	Engineering format	15000	-15000
		2's comp HEX	7FFF	8000
01	+/-50 mV	Engineering format	5000	-5000
		2's comp HEX	7FFF	8000
02	+/-100 mV	Engineering format	10000	-10000
		2's comp HEX	7FFF	8000
03	+/-500 mV	Engineering format	5000	-5000
		2's comp HEX	7FFF	8000
04	+/-1 V	Engineering format	10000	-10000
		2's comp HEX	7FFF	8000
05	+/-2.5 V	Engineering format	25000	-25000

Chapter 1 Introduction

		2's comp HEX	7FFF	8000
06	+/-20mV	Engineering format	20000	-20000
		2's comp HEX	7FFF	8000
07	4 ~ 20 mV	Engineering format	20000	4000
		2's comp HEX	7FFF	8000
0E	Type J Thermocouple -210 ~ 760 °C	Engineering format	7600	-2100
		2's comp HEX	7FFF	DCA2
0F	Type K Thermocouple -270 ~ 1372 °C	Engineering format	13720	-2700
		2's comp HEX	7FFF	E6D0
10	Type T Thermocouple -270 ~ 400 °C	Engineering format	4000	-2700
		2's comp HEX	7FFF	A99A
11	Type E Thermocouple -270 ~ 1000 °C	Engineering format	10000	-2700
		2's comp HEX	7FFF	DD71
12	Type R Thermocouple 0 ~ 1768 °C	Engineering format	17680	0
		2's comp HEX	7FFF	0
13	Type S Thermocouple 0 ~ 1768°C	Engineering format	17680	0
		2's comp HEX	7FFF	0
14	Type B Thermocouple 0 ~ 1820°C	Engineering format	18200	0
		2's comp HEX	7FFF	0
15	Type N Thermocouple -270 ~ 1300 °C	Engineering format	13000	-2700
		2's comp HEX	7FFF	E56B
16	Type C Thermocouple 0 ~ 2320 °C	Engineering format	23200	0
		2's comp HEX	7FFF	0
17	Type L Thermocouple -200 ~ 800 °C	Engineering format	8000	-2000
		2's comp HEX	7FFF	E000
18	Type M Thermocouple -200 ~ 100 °C	Engineering format	1000	-2000
		2's comp HEX	4000	8000
19	Type L DIN43710 Thermocouple -200 ~ 900 °C	Engineering format	9000	-2000
		2's comp HEX	7FFF	E38E
1A	0 ~ 20 mA	Engineering format	+20000	0
		2's comp HEX	FFFF	0

1.9. Software & Document information

The location of all documents and software related to the ET-7000 module is shown in the following directory structure diagram. The relevant file can quickly be located by referring to the diagram.



For details of the 6knnnnnn.exe revision information, please refer to `CD:\NAPDOS\ET7000\Firmware\Version_nnn_Eng.txt` or `Version_nnn_Chi.txt`

1.10. Update Information

Refer to http://www.icpdas.com/products/Remote_IO/ET-7000/et7k_manual_software.htm

2. Configuring the ET-7000

Before using the ET-7000, the following settings must be configured:

- **Network settings:** IP, Mask, and Gateway of ET-7000.

Item	Default
IP Address	192.168.255.1
Subnet Mask	255.255.0.0
Gateway	192.168.0.1

- **Web page Configuration**

Item	Default
Username	Admin (Case sensitive)
Password	Admin (Case sensitive)

Configuring the Network settings of ET-7000 correct makes it works well.

2.1. Configuring the network settings

To configure the network settings of ET-7000, MiniOS7 utility is used to set the Ethernet addresses via the Ethernet environment.

2.1.1. Using the “MiniOS7 Utility”

The MiniOS7 Utility is used to download files to the ET-7000 module and update the OS image. It is also used to configure the network settings.

Step 1: Refer to **Sec. 1.5.2** for details regarding wiring connections for ET-7000 series modules.



Note:

The **Init/Normal** switch is always placed in the **Normal** position.

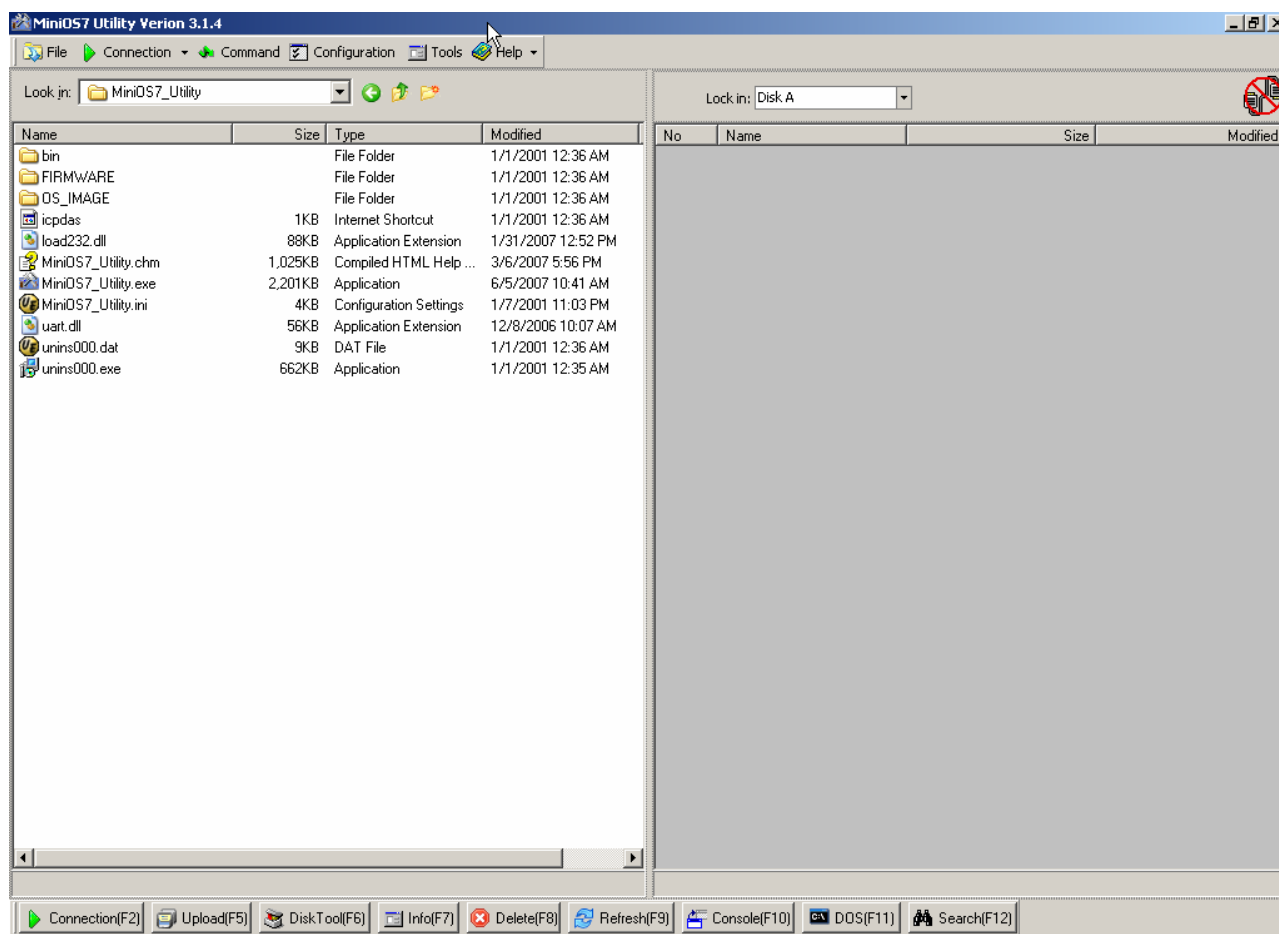
Step 2: Install the MiniOS7 Utility on the host PC by executing

CD:\NAPDOS\ET7000\Tools\Tools for MiniOS7\

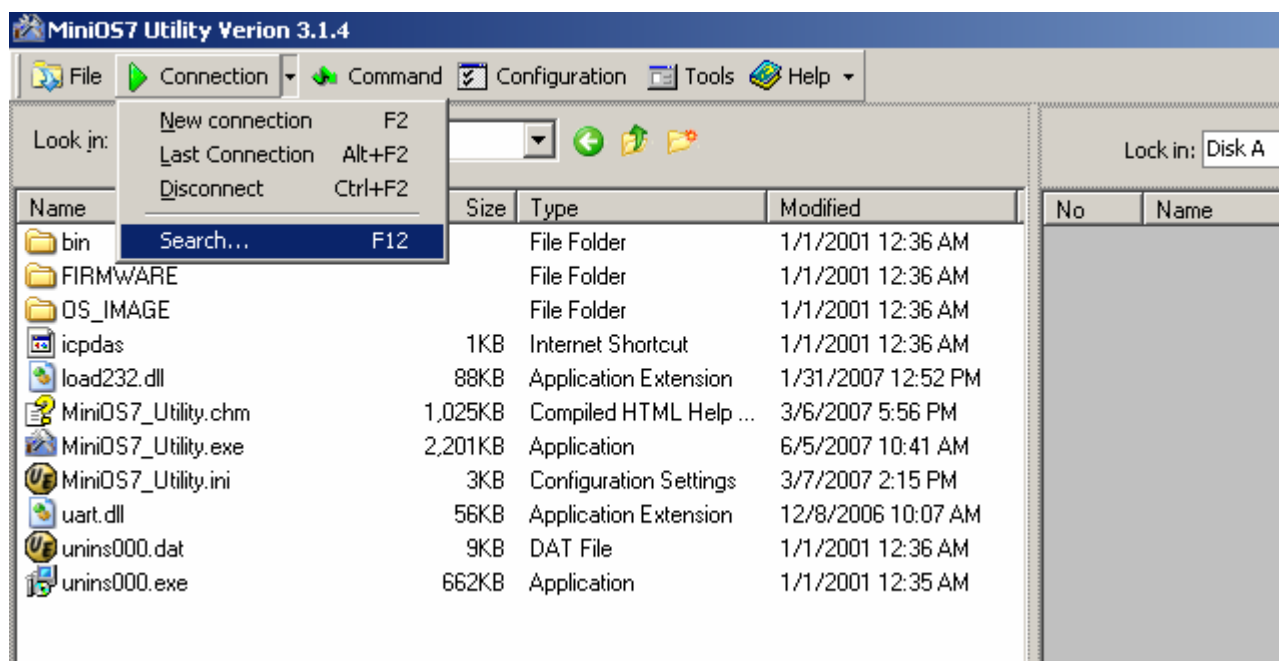
MiniOS7_utility\MiniOS7_Utility.exe and follow the on-screen instructions

Chapter 2 Configuring the ET-7000

Step 3: Run the MiniOS7 utility as per the following diagram.

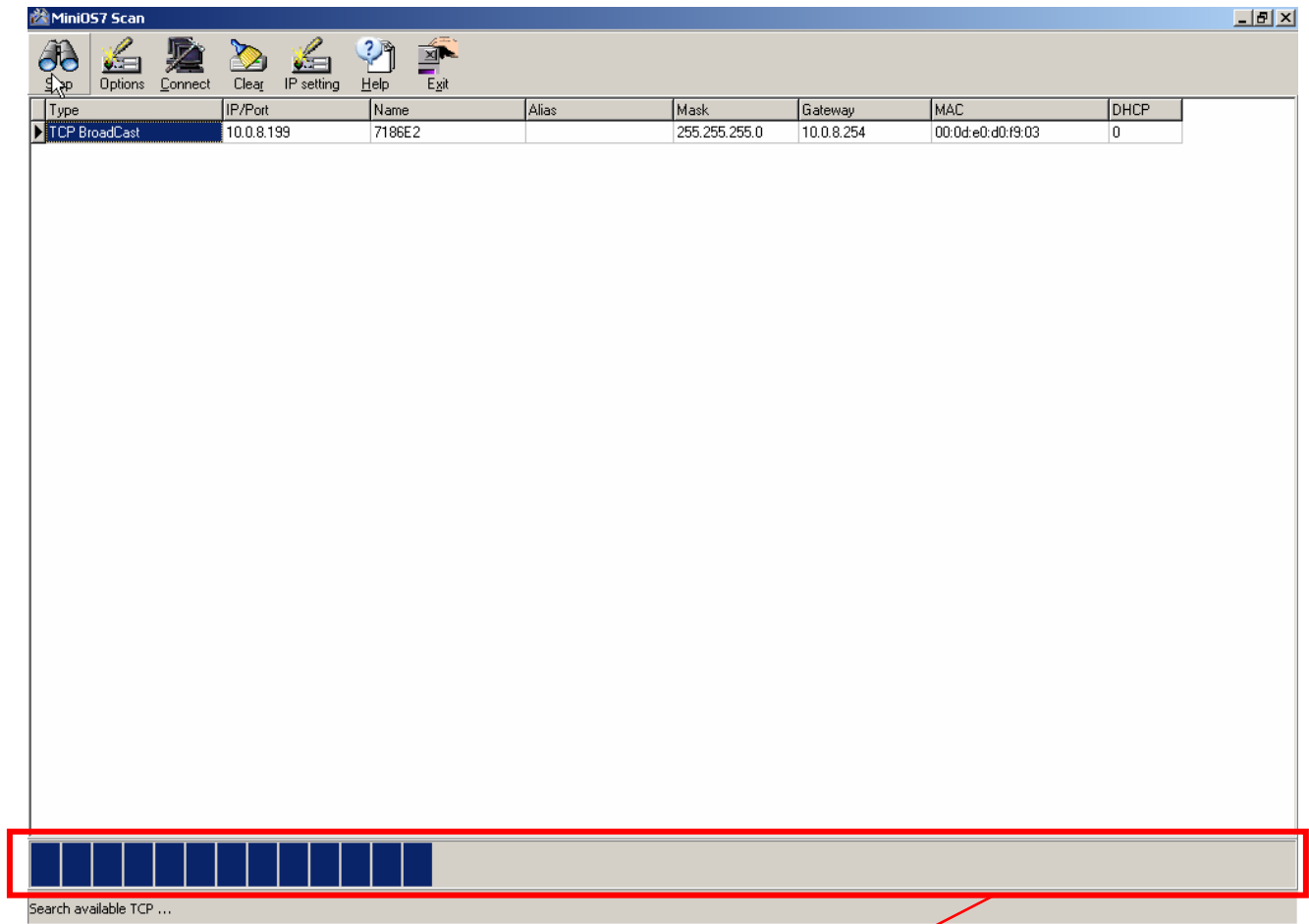


Step 4: Select the **Connection** item of main menu, and then click the “**Search**”.



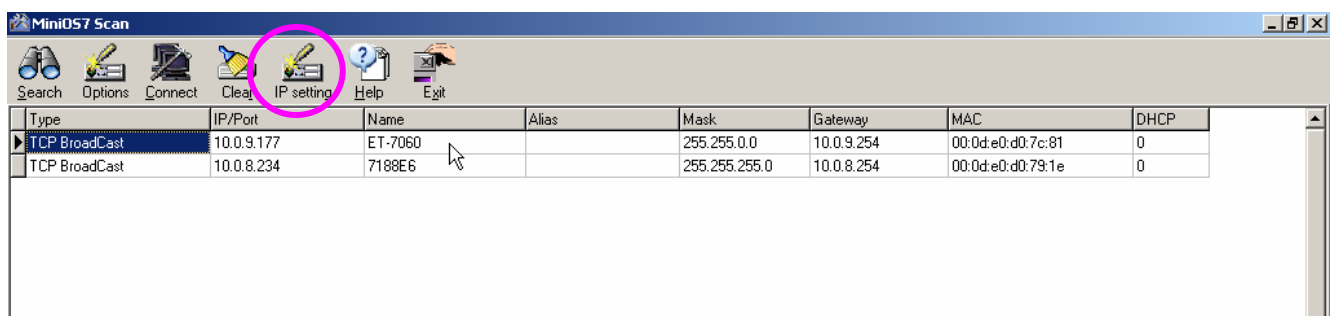
Chapter 2 Configuring the ET-7000

Step 5: The “MiniOS7 Scan” window appears, and starts to search the modules in the same Ethernet network of host PC.



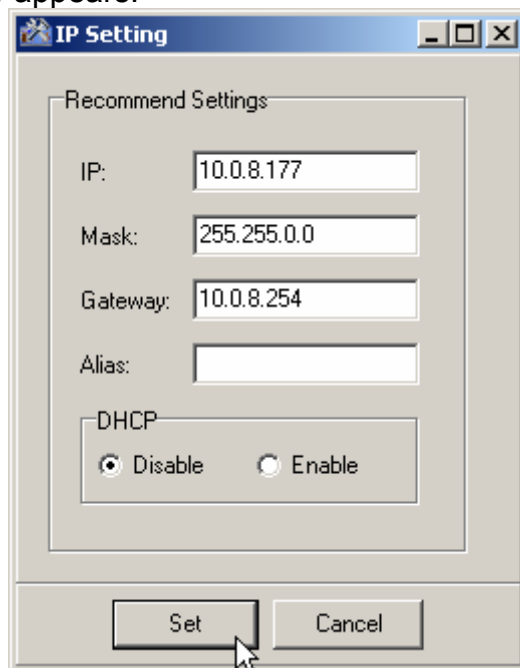
Progress is running

Step 6: When the search is finished, click the ET-7000 module that you want to configure and then click the “IP setting” button.



Chapter 2 Configuring the ET-7000

Step 6: IP Setting window appears.



Step 6.1: Check that valid IP, Mask, Gateway, Alias, DHCP values has been inserted into the “Recommend Settings” fields.

Step 6.2: If these values are modified, the “Set” button must be clicked in order to create the new values.

Step 7: Exit the MiniOS7 Utility and restart the ET-7000 to enable the new settings to take effect.



Note:

Please refer to **Appendix B** for more details regarding the MiniOS7 Utility installation procedure.

2.2. Load Factory Default

Refer to “Load All Setup Default” in **Sec 3.2.2 Basic Setting** for more details regarding loading the factory defaults using the Web configuration.

3. Web Configuration Page

ET-7000 series modules have a built-in Web configuration page with a friendly user interface making it simple to configure using the standard web browser.

The configuration web page is optimized for Microsoft Internet Explorer 6.0, and the other browsers can work well, but the Web pages might appear differently.

All the configuration of ET-70000 is constructed on web page and you can only click the web to do everything through the on-board web pages using a standard web browser via Ethernet. Don't need extra tools or utilities on Windows to configure and control the ET-7000.

Opening the browser to connect the ET-7000

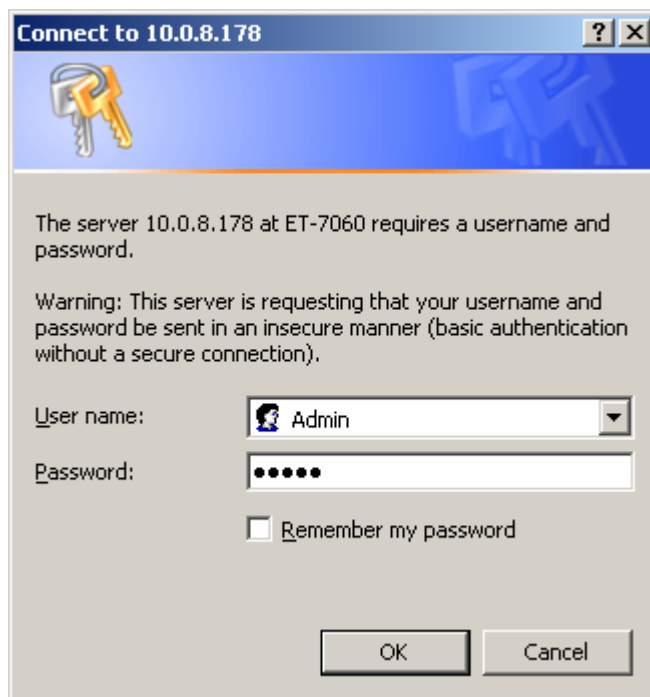
1. Start up the Internet Explorer, and click the URL block at the top of the screen.
2. Input the URL address of the ET-7000 (Such as <http://192.168.255.1>) into the URL block and press the “Enter” button to enter the login page.



Note:

- The Factory default IP address is 192.168.255.1
- The default user name and password is Admin and Admin (Case sensitive)
- If you forget the user name or password, the ONLY way to start configuring ET-7000 is to load factory default by using the web/console configuration

3. Input the User Name and password on the dialog, and then click the “OK” button. (See the dialog box below)



Chapter 3 Web Configuration Page

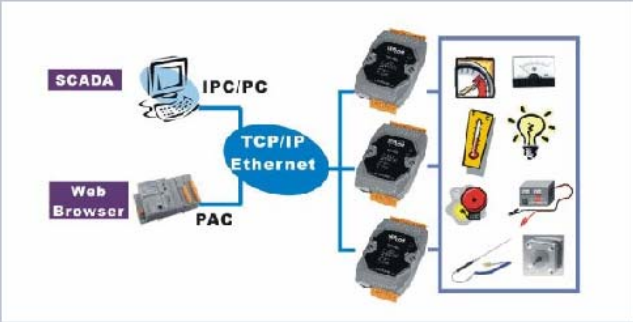
After the user name and password is accepted by the ET-7000, The ET-7000 home page will be displayed.

ICPDAS
<http://www.icpdas.com>

- Main Menu
 - Overview
 - Configuration
 - Network Settings
 - Basic Settings
 - Module I/O Settings
 - Authentication
 - Account Management
 - Accessible IP Settings
 - Web HMI
 - Web HMI
 - Web Editing
 - Pair Connection
 - More Information

Welcome to the ET7000 Web configuration page

Model Name	ET-7060
MAC Address	0:d:e0:d0:6d:47
Module Information	
Firmware Version	V100 (May 25 2007)
OS Version	V226 (May 23 2007)
DI channels	6
DO channels	6
AI channels	0
AO channels	0

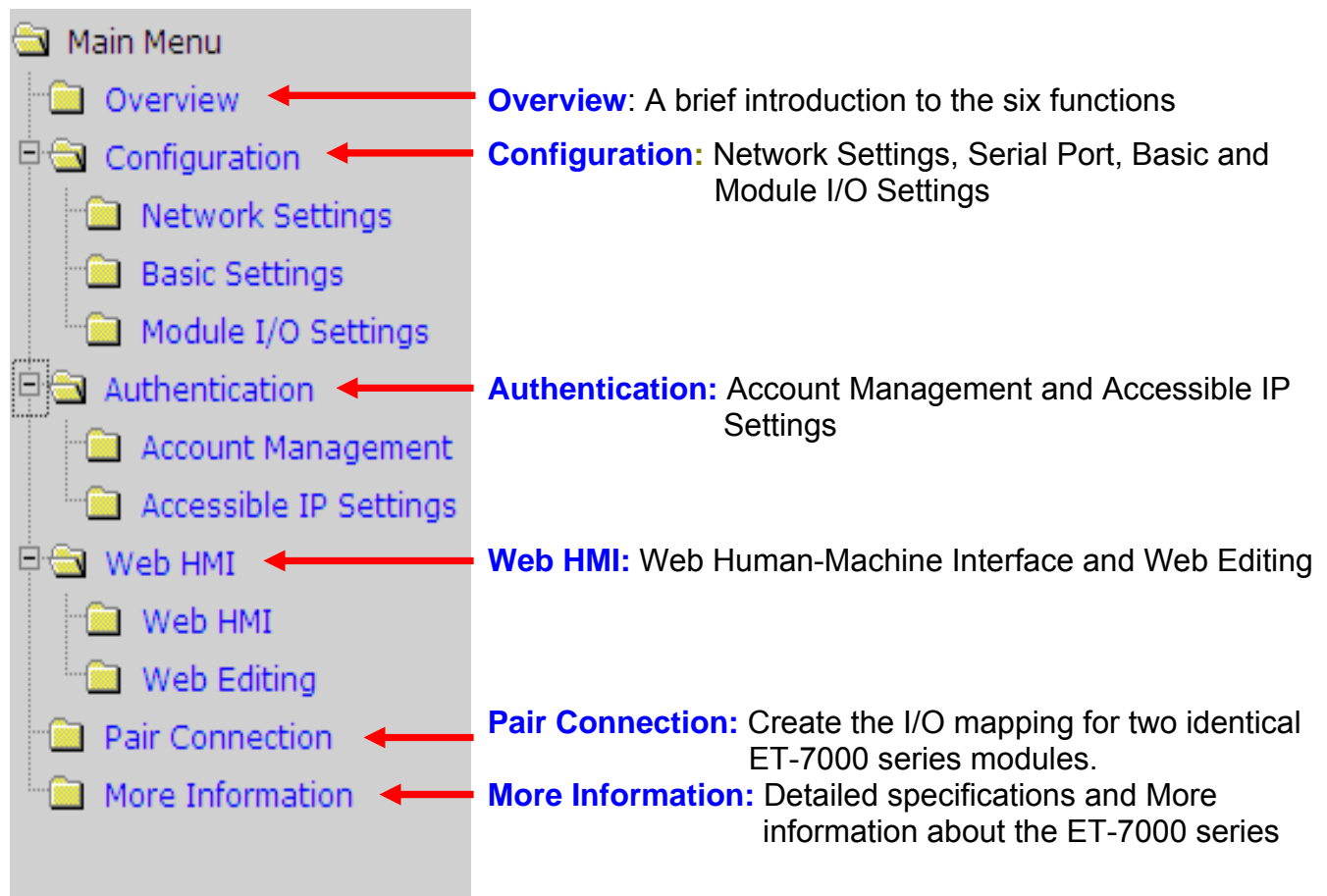




Note:

If either the user name or the password is incorrect or is left blank, the main home page and the other pages will not be accessible, so ensure that the input data is correct and rectify it if and as necessary.

The brief description of the Web page configuration function is listed on six main functions of the tree structure.



3.1. Overview

The Welcome page for the ET-7000 contains information related to the currently accessed ET-7000 series module, as shown below:

Model Name: ET-7000 series module name (The default is the ET-7000 series name. It allows a maximum length of **8** characters)

MAC address: The MAC address of the currently accessed ET-7000 series module

Module Information: The alias name of the ET-7000 series module

Firmware Version: The version number and date of the default firmware

OS Version: The version number and date of the operating system

DI/DO/AI/AO channel: The number of DI/DO/AI/AO channels depends on the specifications of the ET-7000 module.

Welcome to the ET7000 Web configuration page

Model Name	ET-7017
MAC Address	0:d:e0:d0:9:19
Module Information	
Firmware Version	V110 (Nov 18 2008)
OS Version	V226 (May 23 2007)
DI channels	0
DO channels	4
AI channels	8
AO channels	0

General Description

The ET-7000 series is a selection of cost effective, high performance 10/100 Mbps I/O modules designed for remote data collection and remote Ethernet application control. Each ET-7000 module includes its own internal Ethernet configuration, Modbus TCP/IP port and web port, with a built-in simple HMI that makes configuration and access easy, together with an I/O LED display to indicate the current transmission status.

The ET-7000 supports Modbus/TCP without the need for any extra programming. It can be easily connected to most SCADA software such as Indusoft, iFix and Labview. The ET-7000 also supports Web server access allowing the user to monitor and access the remote I/O from a Web browser. Users can also download their own custom defined pages into the ET-7000 via our Windows Utility. ICPDAS also provides a Java Applet application for the ET-7000 as a reference allowing design their own Web interface. □@

Configuration

- [Network Settings](#)

IP address, Net mask, default gateway, DHCP, Static or Dynamic IP, Firmware and OS version information...

- [Basic Settings](#)

Module name, Module information, Real Time Clock, Time Server IP address, Web HMI and Telnet console Enable, Disable functions.
Load the factory default settings

- [Module I/O Settings](#)

Module I/O configuration including DI latch, Digital Counter Enabled/Disabled functions
Settings for Watchdog Timer, DO Power-On value and Safe values, AI High/Low alarm...

Authentication

- [Account Management](#)

3.2. Configuration

3.2.1. Ethernet Settings

Ethernet Settings

Items	Current Value	New Value
IP	10.0.9.133	<input type="text" value="10.0.9.133"/>
Gateway	192.168.0.1	<input type="text" value="192.168.0.1"/>
Mask	255.255.0.0	<input type="text" value="255.255.0.0"/>
DHCP	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	
Web Server Lib Ver.	Version 113 (Sep 25 2008)	
MiniOS7 Ver.	Version 2.02.6	
<input type="button" value="MODIFY_SETTING"/>		

Please access the new IP Address after modifying the configuration

The Ethernet settings page can be used to view and change the TCP/IP network settings for the ET-7000 module.

Table 3-1 TCP/IP network settings

Settings	Description	Range	Factory default
IP	4-byte IP address. Each ET-7000 module needs an IP address so that it can be identified on the network	X.X.X.1 To X.X.X.254	192.168.255.1
Gateway	4-byte Gateway. A gateway is a network address that acts as an entrance to another network. Usually, computers that control the traffic within the network or at the local Internet Service Provider (ISP) are gateway nodes.	X.X.X.0 To X.X.X.254	192.168.0.1
Mask	4-byte subnet Mask. A subnet mask represents all the network hosts at one geographic location on the same local area network. When an Ethernet packet is sent across the network, the ET-7000 will use the subnet Mask to check whether the TCP/IP host specified in the packet is on local network segment.	X.X.X.0 To X.X.X.255	255.255.0.0
DHCP	Select this option If there is a DHCP server on the network, the server can assign the IP address automatically.	0 (Disable) 1(Enable)	0 (Disable)
Firmware Ver.	Firmware Version and Date	N/A	Varies depending on the Module
MiniOS7 Ver.	MiniOS7 Version and Date	N/A	Varies depending on the Module

DHCP function

DHCP (Dynamic Host Configuration Protocol) is a method used to dynamically assign temporary numeric IP addresses as required.

When the DHCP function is enabled, the ET-7000 module will automatically load the IP/Mask/Gateway address saved in the EEPROM if the ET-7000 cannot get a dynamic IP address from the DHCP server on boot up. This may occur if the DHCP server is unavailable or if the Ethernet cable/device between the module and the Host PC is damaged.

In this situation, the ET-7000 will not continue to make requests to the DHCP server until the next reboot, even if the DHCP function is enabled.



Notes:

- For correct IP/Mask/Gateway address information, please consult the network administrator.
- If you don't have a DHCP server available on the network, it is recommended that the DHCP function be disabled.

3.2.2. Basic Settings

Basic Settings	
Module Name	ET-7017 (Maximum 8 characters)
Module Information	(Maximum 16 characters) (The content cannot include ' or " character)
Top page Information (First line)	ICPDAS (Maximum 20 characters) Color Red Font 0
Top page Information (Second line)	http://www.icpdas.com (Maximum 50 characters) Color Red Font 0
More Information URL	http://www.icpdas.com/products/Remote_IO/et-7 (Maximum 100 characters)
Web Server TCP Port	80
Console	
Telnet console	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
Submit	
Load All Setup Defaults	
<input type="checkbox"/>	Configuration
<input type="checkbox"/>	Authentication
<input type="checkbox"/>	Web HMI
<input type="checkbox"/>	Pair Connection
<input type="checkbox"/>	All
Submit	

Module Name:

The initial value will be the default module name. The ET-7000 module supports a maximum file module name length of 8 characters. (**Unavailable**)

Module Information:

Indicates the alias name given to the module and can be modified by the user. The name can be a maximum of 16 characters, but cannot include single or double quotes (' or " character).

After the new values are submitted, the **Module Name** and **Module Information** will be updated. The new details can be verified by viewing the main.htm (Overview of tree), while you submit the new value.

Example:

Click the Basic Setting in the Configuration section of the Main Menu tree.

Enter a string into the Module Information text field, for example, Module1.

Click to enable the settings to take effect.

Chapter 3 Web Configuration Page

Click the “Overview” in the Main Menu tree to verify that the changes have been applied.

Basic Settings

Module Name	ET-7060 (Maximum 8 characters)
Module Information	Module1 (Maximum 16 characters) (The content cannot include ' or " character)
Top page Information (First line)	ICPDAS (Maximum 20 characters) Color: Red Font: 0
Top page Information (Second line)	http://www.icpdas.com (Maximum 50 characters) Color: Red Font: 0
More Information URL	http://www.icpdas.com/products/Remote_IO/et-6 (Maximum 100 characters)

Top page Information (First line) and Top page Information (second line):

The top page information is displayed at the top of the web page, as shown below, and can be modified to enable custom information to be displayed.

ICPDAS
<http://www.icpdas.com>

Main Menu

- Overview
- Configuration
 - Network Settings
 - Basic Settings
 - Module I/O Settings
- Authentication
- Account Management
- Accessible IP Settings
- Web HMI
 - Web HMI
 - Web Editing
- Pair Connection
- More Information

Welcome to the ET7000 Web configuration page

Model Name	ET-7060
MAC Address	0:d:e0:d0:6d:47
Module Information	
Firmware Version	V100 (May 25 2007)
OS Version	V226 (May 23 2007)
DI channels	6
DO channels	6
AI channels	0
AO channels	0



After submitting the new details, the **Top page Information** will be updated and will be displayed at the top of the web configuration page.

Chapter 3 Web Configuration Page

Example:

Click “Basic Settings” in the Configuration Section of the Main Menu tree.

Enter a string in the Top page Information (First line) and Top page Information (second line) text fields, for example “ICPDAS” and “http://www.icpdas.com”. Selecting an option from the color drop down box and entering a value in the font text field can modify the font size and color.

Click button to enable the settings to take effect.

Link to index.htm again or refresh the top page.

The screenshot shows the ICPDAS Web Configuration interface. On the left is a 'Main Menu' tree with 'Configuration' expanded, showing 'Basic Settings' selected. The main area is titled 'Basic Settings' and contains several configuration fields. Red arrows and circles highlight the following fields:

- Module Name:** T-7060 (Maximum 8 characters)
- Module Information:** module1 (Maximum 16 characters) (The content must be at least 8 characters)
- Top page Information (First line):** ICPDAS (Maximum 20 characters)
- Top page Information (Second line):** http://www.icpdas.com (Maximum 50 characters)
- More Information URL:** http://www.w3.org/ (Maximum 100 characters)

Other visible fields include:

- Web Server TCP Port:** 80
- Time:**
 - Time Zone:** (GMT+00)Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London
 - Current Module time:** 2165 / -91 / -91 / -91 / 85 [Check] [Set Now]
 - Time server:** [Empty field]
- Console:**
 - Web Configuration:** [Disable] [Enable] (Enable is selected)
 - Telnet console:** [Disable] [Enable] (Disable is selected)

A 'Submit' button is located at the bottom right of the configuration area.

More Information URL:

It may often be helpful to provide users with additional information while browsing the Web Configuration page.

After submitting the new details, the **More Information** link in the Main menu tree will be updated.

Example:

Click the “Basic Settings” in the Configuration Section of the Main Menu tree

Enter a URL in the “More Information URL” text field, for example “http://www.w3.org”. (The URL may be either an external site or a link to a page on your intranet)

Click to enable the settings to take effect.

Chapter 3 Web Configuration Page

Basic Settings	
Module Name	<input type="text" value="ET-7060"/> (Maximum 8 characters)
Module Information	<input type="text" value="Module1"/> (Maximum 16 characters) (The content cannot include ' or " character)
Top page Information (First line)	<input type="text" value="ICPDAS"/> (Maximum 20 characters) Color <input type="text" value="Red"/> Font <input type="text" value="0"/>
Top page Information (Second line)	<input type="text" value="http://www.icpdas.com"/> (Maximum 50 characters) Color <input type="text" value="Red"/> Font <input type="text" value="0"/>
More Information URL	<input type="text" value="http://www.w3.org/"/> (Maximum 100 characters)

Clicking the “More Information” in the Main Menu tree will automatically open the web page defined in the More Information URL.



The screenshot shows the ICPDAS website with the URL <http://www.icpdas.com>. The main content area displays the W3C World Wide Web Consortium logo and tagline: "Leading the Web to Its Full Potential...". Below this, there are links for "Activities", "Technical Reports", "Site Index", "New Visitors", "About W3C", "Join W3C", and "Contact W3C". A paragraph of text describes the W3C's mission and provides links to "W3C news", "W3C technologies", and "ways to get involved". The sidebar on the left contains a "Main Menu" with links to "Overview", "Configuration", "Authentication", "Web HMI", "Pair Connection", and "More Information". The bottom section of the page is divided into three columns: "W3C Supporters" with a link to "Help W3C by making a donation through the W3C Supporters Program", "News" with a headline "Voice Recommendations Approved for Speech-Driven Web Applications" and a date "2007-06-19", and "Search" with a Google search bar and a link to "Search W3C Mailing Lists".

The default URL for “More information” is “http://www.icpdas.com/products/Remote_IO/ET-7000/ET-7000_introduction.htm”

Chapter 3 Web Configuration Page

Web Server TCP Port:

The default well known port that is used in TCP to name the ends of logical connections for Web server of ET-7000 is 80.

It allows the user to change the port to the other, (0~65535).

Top page Information (Second line)	<input type="text" value="http://www.icpdas.com"/> (Maximum 50 characters)
	Color <input type="text" value="Red"/> Font <input type="text" value="0"/>
More Information URL	<input type="text" value="http://www.icpdas.com/products/Remote_IO/et-7"/> (Maximum 100 characters)
Web Server TCP Port	<input type="text" value="80"/>
Console	
Telnet console	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
<input type="button" value="Submit"/>	

Load All Setup Default

Load All Setup Defaults
<input type="checkbox"/> Configuration
<input type="checkbox"/> Authentication
<input type="checkbox"/> Web HMI
<input type="checkbox"/> Pair Connection
<input type="checkbox"/> All

Table 3-2 Load All Setup Default Table

Function Name	Details	Factory default
Configuration	All of the Ethernet settings	Refer to Table 3-1
	All of the Module I/O settings	Refer to Sec. 3.2.3
Authentication	Account management	The default account is “ Admin ” and the password is “ Admin ”
	IP filter settings	Allow all of the IP connections
Web HMI	Web Page editing function	0 pages
Pair Connection	I/O Pair connection	Disabled
All	Set the factory default value for the 4 main functions above. (Configuration, Authentication, Web HMI, Pair Connection)	Refer to the function details above.

Press the button to allow the settings to take effect.



Note:

Be aware that after modifying the settings and submitting the new information, all previous settings for the module will be lost.

3.2.3. Module I/O settings

Different Modbus setting functions will be displayed on this page depending on the type of ET-7000 module. All settings can be divided into either common, DI, DO, AI and AO settings.

Please refer to **Appendix C** for more details regarding ET-7000 Modbus register table.

The illustration below shows the Modbus settings for the ET-7060 module

Modbus Settings (Common Functions)		
Modbus Address	Function	Action
126	Recover all I/O default settings	<input type="checkbox"/> 1=recover
129	Web Enable/Disable	<input checked="" type="checkbox"/> 0=disable/1=enable (default=1)
133	Reboot ET-7000	<input type="checkbox"/> 1=reboot
40255	CPU reset status	1 1= power on/2= 0.8 second WDT/3= Reset command
40256	CPU reset events	18071 reset count
40257	Set host watch dog timer	33023 5:Disable 5~65535:Enable (unit:second) (default=0)
40258	Host WDT events	0 WDT count

Modbus Settings (DI Latch)		
Modbus Address	Function	Action
32	Clear all DI latched Status (High)	0 <input type="checkbox"/> 1=clear
33	Clear all DI latched status (Low)	0 <input type="checkbox"/> 1=clear
150	Enable all DI latched status(High/Low)	<input checked="" type="checkbox"/> 0=disable/1=enable (default=0)

Chapter 3 Web Configuration Page

Modbus Settings (DO Power/Safe Value)

Modbus Address	Function	Action
235	Power on value for DO	<div>0 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>1 OFF <input type="radio"/> <input checked="" type="radio"/></div> <div>2 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>3 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>4 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>5 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>0=off/1=on (default=0)</div>
267	Safe value for DO	<div>0 OFF <input type="radio"/> <input checked="" type="radio"/></div> <div>1 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>2 OFF <input type="radio"/> <input checked="" type="radio"/></div> <div>3 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>4 OFF <input type="radio"/> <input checked="" type="radio"/></div> <div>5 OFF <input type="radio"/> <input checked="" type="radio"/></div> <div>0=off/1=on (default=0)</div>

Submit

Chapter 3 Web Configuration Page

Modbus Settings (DI Counter)

Modbus Address	Function	Action
151	Enable low speed(100Hz) Digital counter	<div>0 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>1 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>2 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>3 OFF <input type="radio"/> <input checked="" type="radio"/></div> <div>4 OFF <input type="radio"/> <input checked="" type="radio"/></div> <div>5 OFF <input checked="" type="radio"/> <input type="radio"/></div> <div>0=disable/1=enable (default=0)</div>
34	Clear low Speed(100Hz) digital Counter	<div>0 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div>
40050	Preset value for low speed (100Hz) digital counter	<div>0 <input type="text" value="1277"/></div> <div>1 <input type="text" value="55157"/></div> <div>2 <input type="text" value="18057"/></div> <div>3 <input type="text" value="65270"/></div> <div>4 <input type="text" value="59845"/></div> <div>5 <input type="text" value="65378"/></div> <div>0~65535 (default=0)</div>

Submit

Chapter 3 Web Configuration Page

Modbus Registers and Factory Defaults

Common Functions

Modbus Address	Points	Description	Range	Factory default
40557	1	Set host watch dog timer (Second)	5~65535 (Enable) (<5: Disable)	0 (Disable)

DO Module Functions

Modbus Address	Points (Max.)	Description	Range	Factory default
00435~00514	80	Power on value for DO	0=off / 1=on	0
00515~00594	80	Safe value for DO	0=off / 1=on	0

AI Module Functions

Modbus Address	Points (Max.)	Description	Range	Factory default
00595~00626	32	Enable/Disable AI channel	0=disabled 1=enabled	1
00628	1	Normal/Fast mode for AI	0=normal (16 bit) 1=fast (12 bit)	0
00629	1	50/60 Hz rejection for AI	0= 50 Hz 1=60 Hz	1
40296~40327	32	High alarm value for AI	-32768 ~ +32767	32767
40328~40359	32	Low alarm value for AI	-32768 ~ +32767	-32768
40700~40731	32	High alarm mode	0= moment 1= latched	0
40732~40763	32	Low alarm mode	0= moment 1= latched	0
40427~40458	32	Type code for AI	Refer to type code table	Depends on the type of Module

3.3. Authentication

3.3.1. Account management

Privilege management

No.	Account	Password	Verify	Authority	Enable
1	Admin	....	....	Admin	On
2	123	....	....	Admin	<input checked="" type="checkbox"/>
3	abc	....	....	User	<input checked="" type="checkbox"/>
4				Admin	<input type="checkbox"/>
5				Admin	<input type="checkbox"/>

Account: (Maximum 8 characters)
Password: (Maximum 8 characters)

☐ Load Setup Default

Each ET-7000 series module provides access privilege for up to five user accounts including a default **Admin** account and four general user-defined accounts. Each of the user-defined accounts can be assigned either Admin or general user privilege. Assigning Admin privilege allows the account to read and write configuration settings but the general user account is restricted to read only access. The maximum number of characters that can be used for an account name is 8.

Each of the account requires password authentication. The maximum number of characters allowed for the password is 8.

Load Setup Defaults: Load the factory default Account management settings. All current accounts will be deleted, except the Admin account, and the password of Admin account will revert to "Admin".

Press the button to enable the settings to take effect.



Notes:

- The default account is called "Admin" and the password is also "Admin". The password and the Admin account can be changed, but the account name cannot be changed or deleted.
- If you forget the password for the Admin account, the ONLY way to configure the ET-7000 is by using the "Reset to Factory default" option. (Please refer to Load All Setup Default on Sec. 3.2.3 for more information)

3.3.2. IP filter Settings

IP filter Settings

☐ Enable the IP filter table. ("Disable" will allow connection requests from all IPs.)

IP address at the browser PC: 10.0.8.12

No.	Active the rule	From (IP Address)	To (IP Address)
1	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
2	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
3	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
4	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
5	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
6	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
7	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
8	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
9	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
10	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

Each ET-7000 series module contains an IP filter that can be used to control access to the module, thereby preventing unauthorized access from unknown IP addresses. The IP filter can be granted across a range of IPv4 addresses, such as from 10.0.8.1 to 10.0.9.22 or to a single IP address, with a maximum of ten permission rules. Once the IP addresses that have been granted access permission have been entered, and the rule activated, the ET-7000 module IP filter will guard the TCP/IP connection by restricting access to any unauthorized IP addresses.

There are three methods of restricting or granting access permissions.

- **Allow Only a specific IP address**

Enter the same IP address in both the **From** and **To IP Address** text fields

Active the rule	From IP Address	To IP Address
<input checked="" type="checkbox"/>	<input type="text" value="192.168.255.1"/>	<input type="text" value="192.168.255.1"/>

- **Allow Hosts within a specific IP address range**

Enter the first IP address in the **From IP Address** text field, and enter the last IP address in the permitted range in the **To IP Address** text field.

Chapter 3 Web Configuration Page

Active the rule	From IP Address	To IP Address
<input checked="" type="checkbox"/>	<input type="text" value="10.0.8.1"/>	<input type="text" value="10.0.9.22"/>

- **Allow access from any IP address**

Disable IP filter function to allow access to the ET-7000 module from any address.

☐ Enable the IP filter table. ("Disable" will allow connection requests from all IPs.)

The "Enable the IP filter table" checkbox must be checked when granting permissions to either a single IP address or a range of IP address.

☒ Enable the IP filter table. ("Disable" will allow connection requests from all IPs.)

Press the button to enable the settings to take effect.



Note:

The IP filter is set to "disabled" by default, meaning that access to the ET-7000 module is allowed from any IP address.

3.4. Web HMI

3.4.1. Web Editing

The Web page configuration can be used to create a user-defined Web page.

No	Page Description	Function
1	111	Edit Delete
2	sea	Edit Delete
3	funny	Edit Delete
4	fdd	Edit Delete
5	asdf	Edit Delete
6	0sadf	Edit Delete

Add new Page

Click “Web Editing” in the “Web HMI” section of the Main menu tree and the window above will be displayed.

Click the “Add new Page” button to create a new page.

Click the “Edit” link to edit the selected page.

Click the “Delete” link to remove the selected page.

The list box on the left hand side of the “Web Page Configuration” window lists all existing pages including the main page, pair connection page.

A maximum of 10 pages can be created.

: Browses the Web HMI with the name listed on the list box.




Notes:

- By default, no existing pages will be listed in the Web Page Configuration window.
- The “Main page” shown in the HMI list box located on the left hand side of the “Web Page Configuration” window is a standard default Web HMI page and cannot be deleted.
- The Pair Connection Page can be enabled by enabling the I/O pair connection function in the “Pair connection” section of the Main menu tree. Please refer to Sec 3.5 for more details.

Chapter 3 Web Configuration Page


Page properties

Web Page Configuration



Picture:

The total spaces for saving picture only is 64KB, the picture must be less than 64k


 **ET6K.jpg** : 06/30/2126 17:46:9, size=17427
Free space=48045 bytes

Page Name: Picture: ☐ Set as Start page

Group							
	Register	Alias	Scaling	Type	Data type		
1	1	Voltage1	1	Holding	Signed 16	<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
2	1	Voltage1	0	Coil	Boolean	<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
3						<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
4	0	DO0	0	Coil	Boolean	<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
5						<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
6						<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
7						<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
8						<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
9						<input type="button" value="Edit"/>	<input type="button" value="Clear"/>
10						<input type="button" value="Edit"/>	<input type="button" value="Clear"/>


All properties can be configured on this page.


Web Page Configuration



Picture:

The total spaces for saving picture only is 64KB, the picture must be less than 64k

 **ET6K.jpg** : 04/06/2006 15:40:29, size=17427

 **conveyer.gif** : 08/14/2126 17:46:32, size=14251

Free space=51221 bytes

Picture Preview

The free space for

File tree: The files

Chapter 3 Web Configuration Page

A maximum of 10 items in each group can be configured.

Picture:

: The image file name selected by clicking the “Browse” button.

The image file type can be either of **.jpg**, **.gif** or **.bmp**. The recommended resolution for the image to be displayed on the Editing Web page is 340 * 250 pixels.

Each ET-7000 series module has a maximum storage space of 64KB.

Browse...

: Browse a directory on the local disk to select an image file to be uploaded to the ET-7000 module.

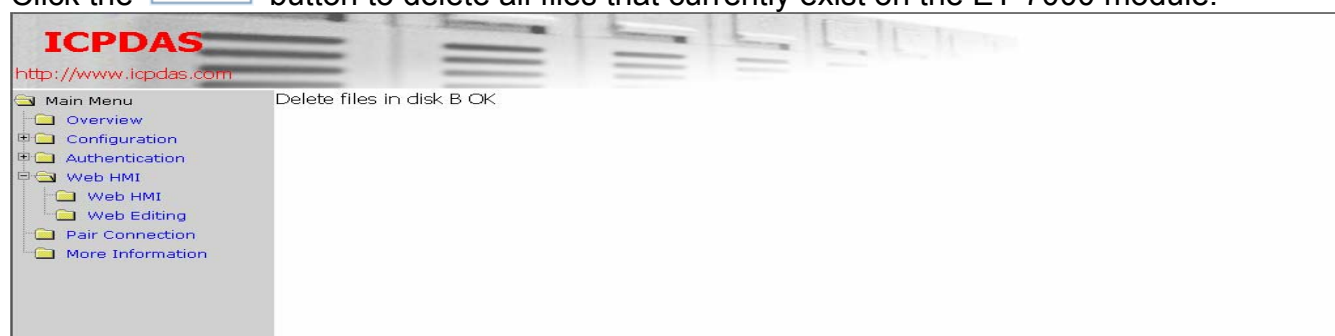
Upload

: Upload the selected image file to the ET-7000 module.

Del All

: Delete all files that are currently stored on the ET-7000 module.

Click the button to delete all files that currently exist on the ET-7000 module.



Notes:

- The “Del All” action will delete all files currently stored on the ET-7000 module, and it cannot be used to delete individual files.
- The ET-7000 will reboot after deleting the files.

Page Name:

Picture:

☐

Set as Start page

Page Name: This field can be used to give the page a more descriptive name. The maximum number of characters that can be used for a page name is **10**.

Image: Use the list box to choose the image to be displayed in the preview window.

Save: The information displayed on this page will be saved after clicking this button.

Set as the Start Page: Clicking the checkbox to make the current page to be displayed when clicking the Web HMI link in the Web HMI section of the Main Menu tree.

: Clicking this button will link to the “Edit Group Register” page to allow the point information to be edited.

: Click the “Clear” button to delete the point information.

Refer to next Section for more details regarding the definition of the field if the “**Group**” Table.

Editing the Group Register

MainPage Go

Edit Group Register

Modbus Register	1
Alias	Voltage1
Scaling	Enabled 0
Register Type	Holding Read
Data type	Signed 16

Save

Modbus Register: The Modbus Register number for the ET-7000 module

Alias: A string that describes the Modbus register. It can be a reference to a tag in the image of the Web editing page that is selected from the “Page properties” section. (If the tag of the Modbus register has defined on the image)

Scaling: The Modbus register value will be divided by the scale value before being displayed on the web page, or multiplied before value is written to the ET-7000 module. This function is only used for Input or Holding register types.

- **Enable:** Enable the Scaling function
- **Disable:** Disable the Scaling function

Example:

1. Modbus register value= 620, Scale value=10 → 62.0 will be shown on the Web page.
2. Modbus register value=7325, Scale value=1000 → 7.325 will be shown on the Web page.
3. Web page input= 32.20, Scale value=100 → 3220 will be written to the Modbus register.

Register Type: Defines the Modbus register type.

Bit format: **Coil** (Digital Output), **Discrete input** (Digital Input).

Byte format: **Input** (Analog Input), **Holding** (Analog Output).

Data Type: Defines the data type of the Modbus register and must be either Input or Holding. The data type can be one of the following:

Table 3-3 Input or Holding Data Types

Data Type	Definition
Unsigned 16	A 16-bit positive value
Signed 16	A 16-bit value with a sign
Unsigned 32	A 32-bit positive value. The Most significant word (register) is on the low address.

Chapter 3 Web Configuration Page

Signed 32	A 32-bit value with sign. The Most significant word (register) is on the low address.
Unsigned 32 (swapped)	A 32-bit positive value. The Most significant word (register) is on the high address.
Signed 32 (swapped)	A 32-bit value with sign. The Most significant word (register) is on the high address.
Float	A 32-bit floating point. (IEEE754). The Most significant word (register) is on low address.
Float (swapped)	A 32-bit floating point. (IEEE754). The Most significant word (register) is on high address.

Click the button to save all settings.

The diagram below shows an example of how to select a Coil register type with a Modbus Register Address of 1 and Alias name of Voltage 1.

Other text fields that aren't related to the Coil register type will be disabled.

The Modbus Register and Alias text fields are only related to the Coil and Discrete Input register types, but the other fields aren't related.

MainPage

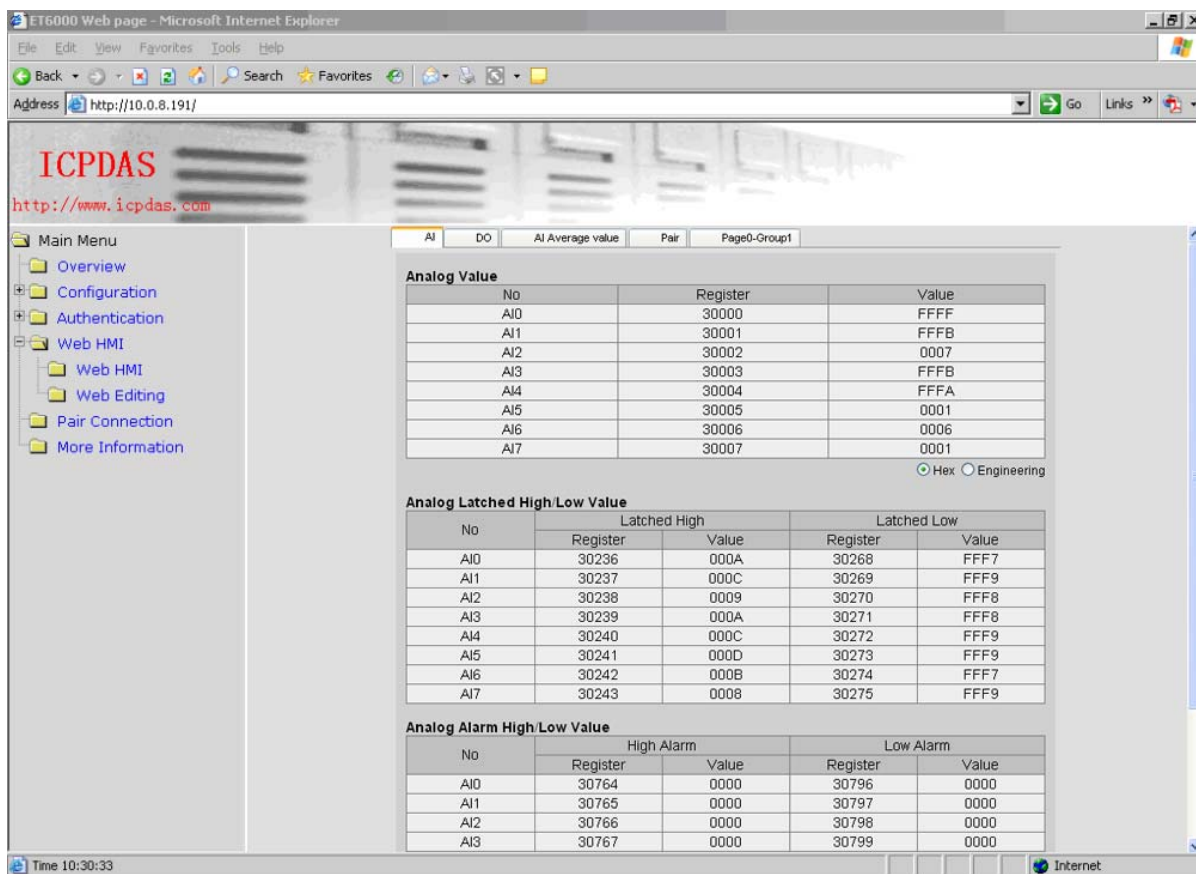
Edit Group Register

Modbus Register	<input type="text" value="1"/>		
Alias	<input type="text" value="Voltage1"/>		
Scaling	<input type="text" value="Disabled"/>	<input type="text" value="0"/>	
Register Type	<input type="text" value="Coil"/>	<input type="text" value="Write"/>	
Data type	<input type="text" value="Signed 16"/>		

Chapter 3 Web Configuration Page

3.4.2. Web HMI

The first page displayed in the client Web browser will be the page that is defined by clicking the “Set as Start Page” checkbox on the “Page properties” area of the “Web page configuration” page in the “Web Editing” section of the Main Menu tree. The default start page is the Main Web HMI page shown as follow.



The Main Web HMI page shows all the components of the ET-7000.

For example, the Main Web HMI page for an ET-7017 module will display the 4 DO and 8 AI components.

Table 3-4 Main Web HMI Page - Table1

Title Name	Description	Notes
No.	The Component type and address	
Register	The Register address	
Value	AO: A numeral of Integer or float	
Latched High	AI High Latch value	
Latched Low	AI Low Latch value	
High Alarm	AI High Alarm value	
Low Alarm	AI Low Alarm value	

Chapter 3 Web Configuration Page

Table 3-5 Main Web HMI Page - Table 2

Title Name	Description	Notes
No.	The Component type and address	
Register	The Register address	
Status/Action	DO: ON (1), OFF (0)	

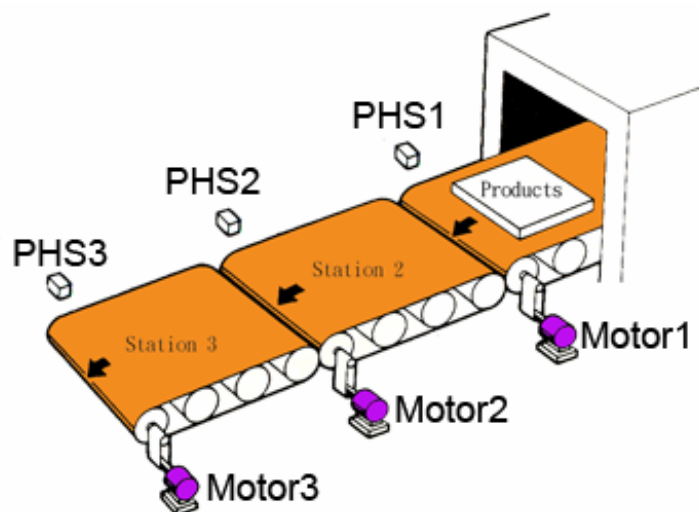
Connection Status:

The status indicates the connection status of the IO component on ET-7000 module defined on the cell of IO channel and Modbus register mapping table.

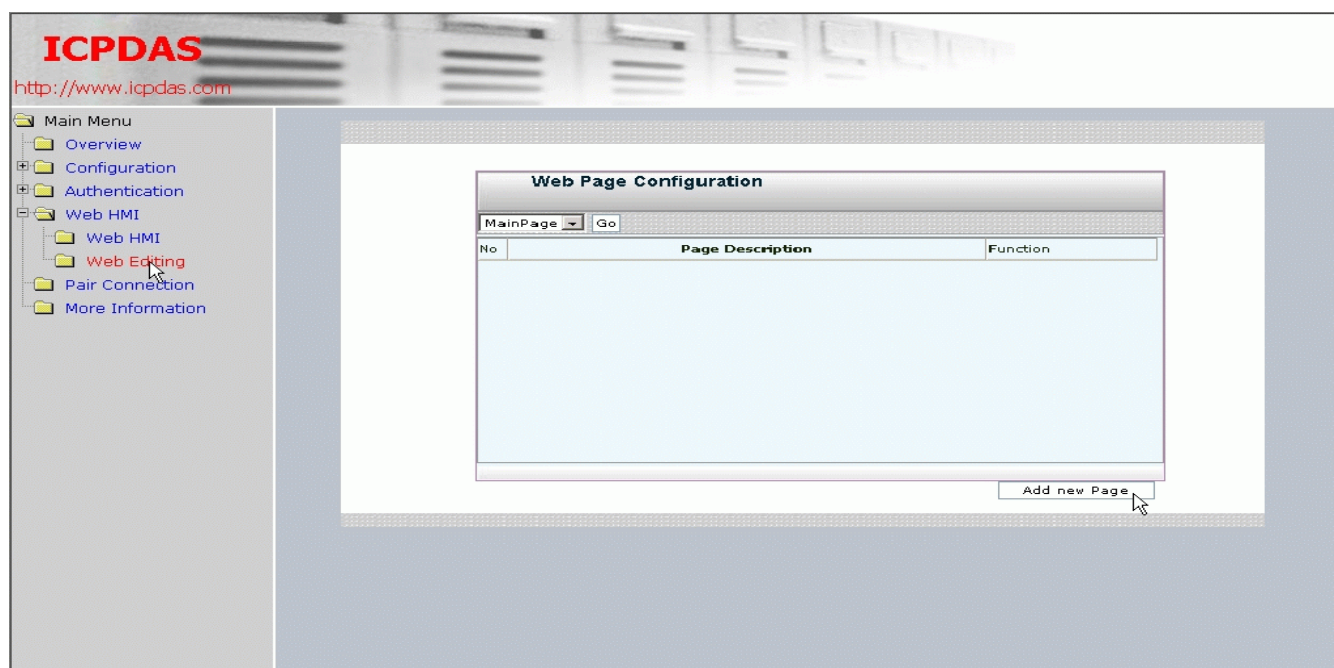
Chapter 3 Web Configuration Page

An example of how to create a Web Editing Page

Create a Web page to monitor the I/O of the conveyor system shown below. The I/O system contains 3 photo sensors that are used to detect the products, and 3 switches that are used to turn the conveyor motor on and off.

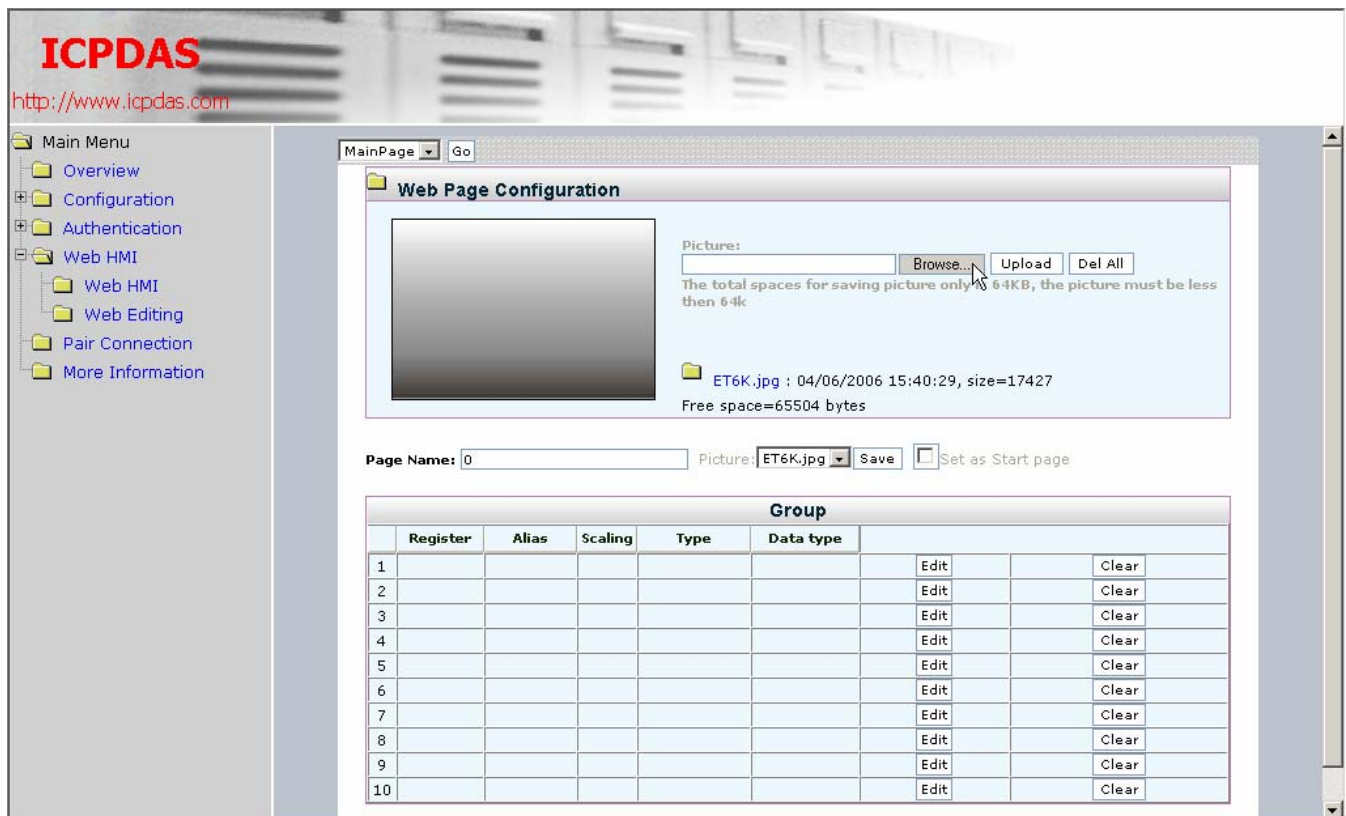


Click the “Web Editing” link in the “Web HMI” section of the Main Menu tree and the “Web page Configuration” window will be displayed on the right hand of the browser windows. Click the “Add new Page” button to create a new editing page.



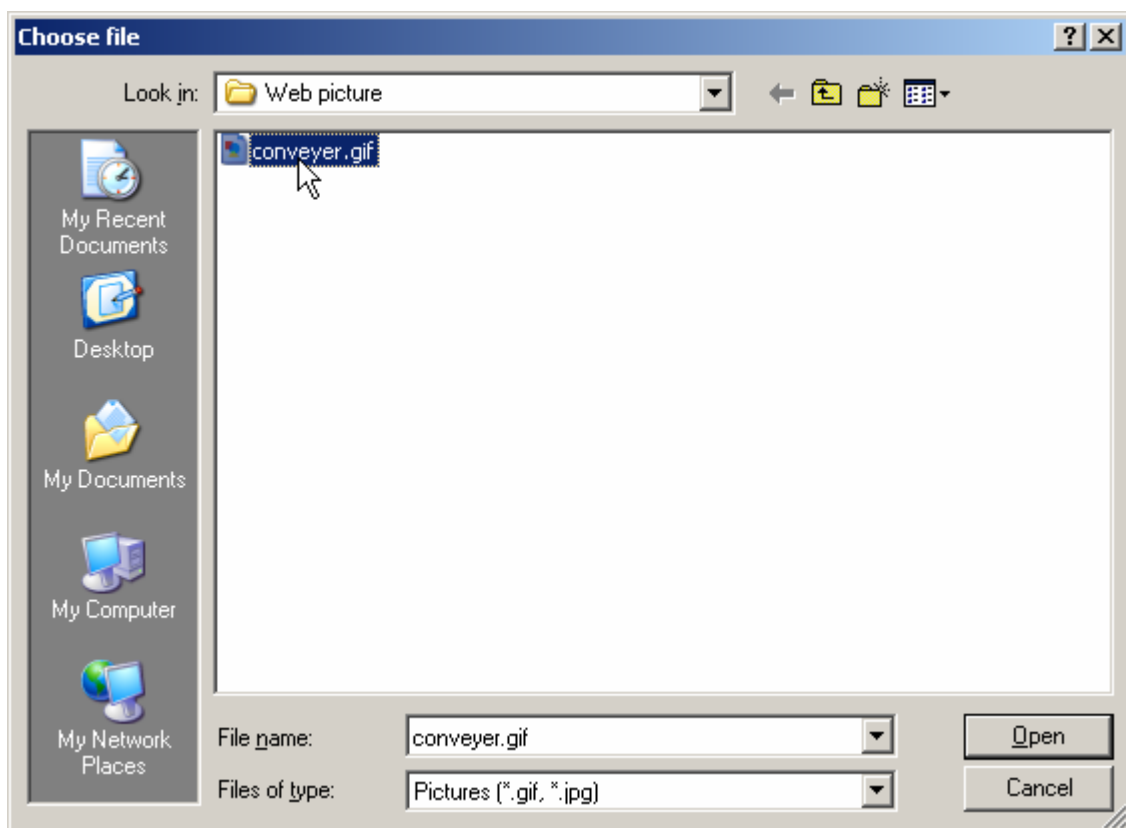
The first going to do is to upload an image file to the ET-7000 module. Click the “Browse” button to locate the file (.jpg, .gif, .bmp) on your system.

Chapter 3 Web Configuration Page



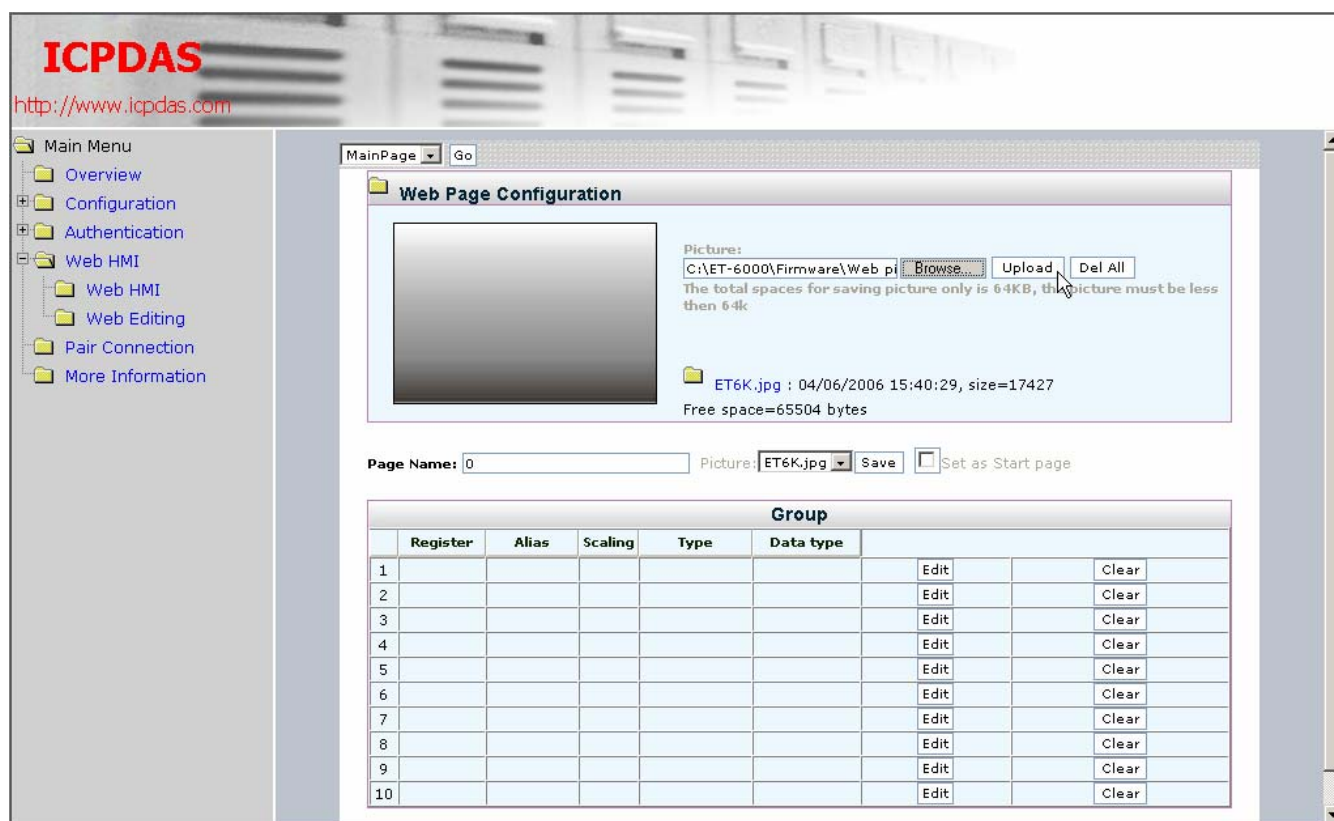
Navigate to the required directory and select the appropriate image file. "conveyer.gif" is selected in this example.

Highlight the file name and Click the "Open" button to make your selection.



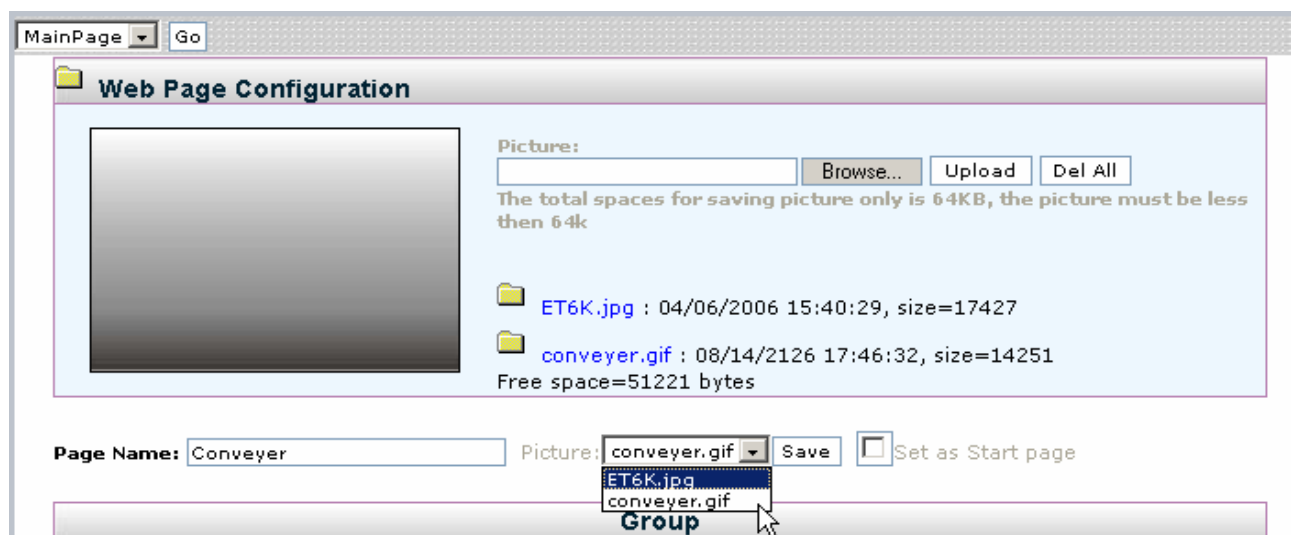
Chapter 3 Web Configuration Page

Click the **“Upload”** button to upload the selected file to the ET-7000 module.



After the upload is completed, the “conveyer.gif” file should now be listed in the file tree and also in the image list box.

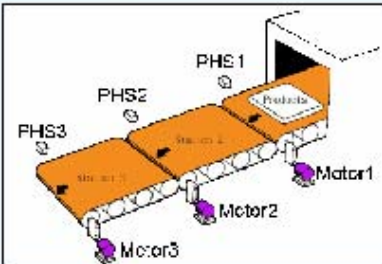
1. Enter the page name “Conveyer” to the “Page Name” text field.
2. Select the “conveyer.gif” file from the image list box (the image will be shown in the Preview window)



Chapter 3 Web Configuration Page

MainPage Go

Web Page Configuration



Picture: Browse... Upload Del All

The total spaces for saving picture only is 64KB, the picture must be less than 64k

ET6K.jpg : 04/06/2006 15:40:29, size=17427

conveyor.gif : 08/14/2126 17:46:32, size=14251

Free space=51221 bytes

Page Name: Picture: Save ☐ Set as Start page

Group								
	Register	Alias	Scaling	Type	Data type			
1						Edit		Clear
2						Edit		Clear
3						Edit		Clear
4						Edit		Clear
5						Edit		Clear
6						Edit		Clear
7						Edit		Clear
8						Edit		Clear
9						Edit		Clear
10						Edit		Clear

To add a register item, click the **Edit** button in the first row of the “Group” table and the “Edit Group Register” window will be displayed.

Add a new DI item using the Register Address 1, then select Discrete Input as the register type and enter “PHS1” as the alias. Refer to the following two diagrams as an example, and then Press the **Save** button to save the information on this page.

MainPage Go

Edit Group Register

Modbus Register	<input type="text" value="1"/>
Alias	<input type="text" value="Voltage1"/>
Scaling	<input type="text" value="Disabled"/> 0
Register Type	<input type="text" value="Discrete Input"/> Read
Data type	<input type="text" value="Coil"/>

Discrete Input
Coil
Discrete Input
Input
Holding

Save

Chapter 3 Web Configuration Page

MainPage Go

Edit Group Register

Modbus Register	1
Alias	PHS1
Scaling	Disabled 0
Register Type	Discrete Input Read
Data type	Signed 16

Save

The new register item will now be displayed in the “Group” table.

Group							
	Register	Alias	Scaling	Type	Data type		
1	1	PHS1	0	Discrete Input	Boolean	Edit	Clear
2						Edit	Clear
3						Edit	Clear
4						Edit	Clear
5						Edit	Clear
6						Edit	Clear
7						Edit	Clear
8						Edit	Clear
9						Edit	Clear
10						Edit	Clear

Add a DO register item by clicking on the Edit button on the second row of the “group” table then selecting the Register Address 1, select “Coil” as the Register type and enter the alias name “Motor 1”, as shown below..

MainPage Go

Edit Group Register

Modbus Register	1
Alias	Motor1
Scaling	Disabled 0
Register Type	Coil Write
Data type	Signed 16

Save

Repeat the steps above to add the other items, in this example, there are 3 DI items and 3 DO items.

After all required register items have been added, Press **Save** button to save this editing page.

Chapter 3 Web Configuration Page

MainPage
Go

Picture:

Browse...
Upload
Del All

The total spaces for saving picture only is 64KB, the picture must be less than 64k

ET6K.jpg : 04/06/2006 15:40:29, size=17427

conveyer.gif : 08/14/2126 17:46:32, size=14251

Free space=51221 bytes

Page Name:
Picture:
Save
☐ Set as Start page

Group									
	Register	Alias	Scaling	Type	Data type				
1	1	PHS1	0	Discrete Input	Boolean	Edit			Clear
2	2	PHS2	0	Discrete Input	Boolean	Edit			Clear
3	3	PHS3	0	Discrete Input	Boolean	Edit			Clear
4	1	Motor1	0	Coil	Boolean	Edit			Clear
5	2	Motor2	0	Coil	Boolean	Edit			Clear
6	3	Motor3	0	Coil	Boolean	Edit			Clear
7						Edit			Clear
8						Edit			Clear
9						Edit			Clear
10						Edit			Clear

Web Page Configuration

MainPage
Go

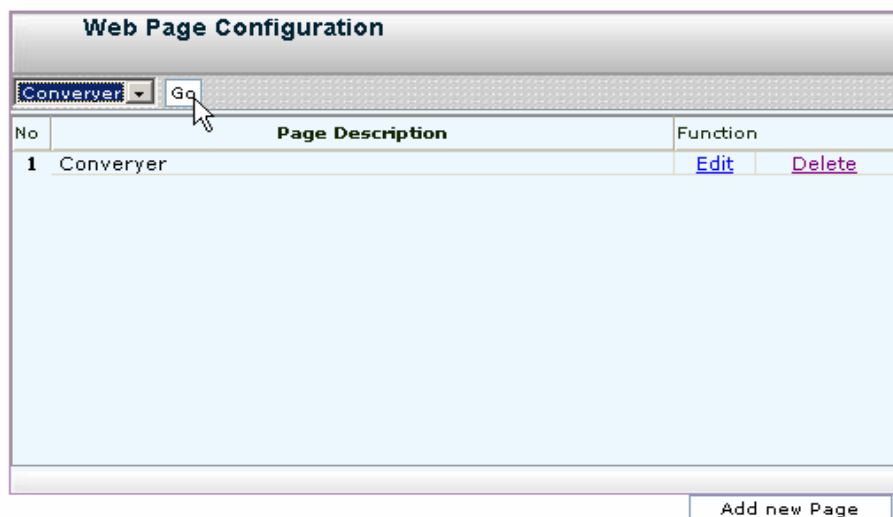
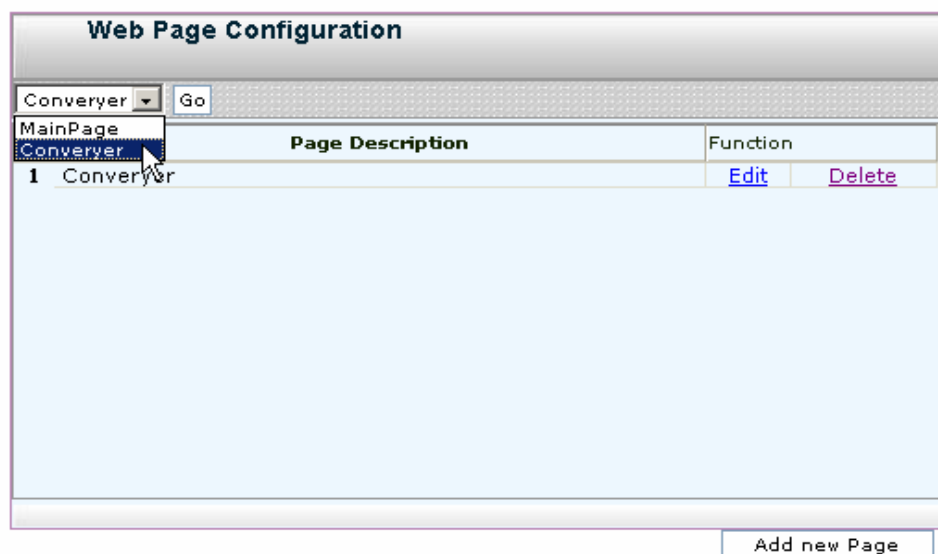
No	Page Description	Function
1	Conveyer	Edit Delete

Add new Page

Chapter 3 Web Configuration Page

An editing page named as “Conveyer” has added to the list box on the top left-hand side of the “Web Page Configuration” window.

Select the “Conveyer” item and click  button to browse to the “Conveyer” Web HMI page.



Chapter 3 Web Configuration Page

The “conveyer.gif” image file and all register items should be displayed on the “Conveyer” Web HMI page.

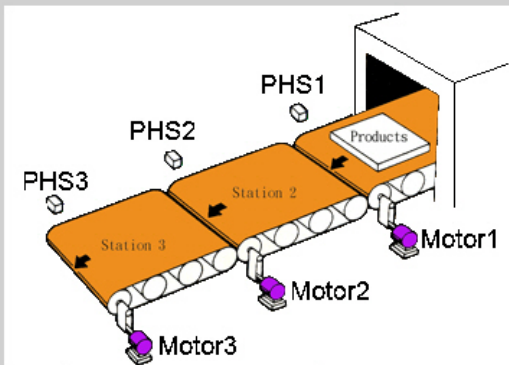
AI

DO

AI Average value

Pair

Page0-Group1



PointNo	Register	Alias	Status/Action
0	00000	DO	<div>1</div> <div>ON OFF</div>
1	30000	Voltage1	FFFD
2	30007	Voltage2	0003

Scan rate:

1000 ms

Submit

Communication Status:

Good

3.5. I/O Pair Connection

The function is used to make a DI to DO pair through the Ethernet. The communication is based on Modbus/TCP. Once the configuration is done, the ET-7000 can poll Remote DI status and then write to a local DO device constantly in the background.

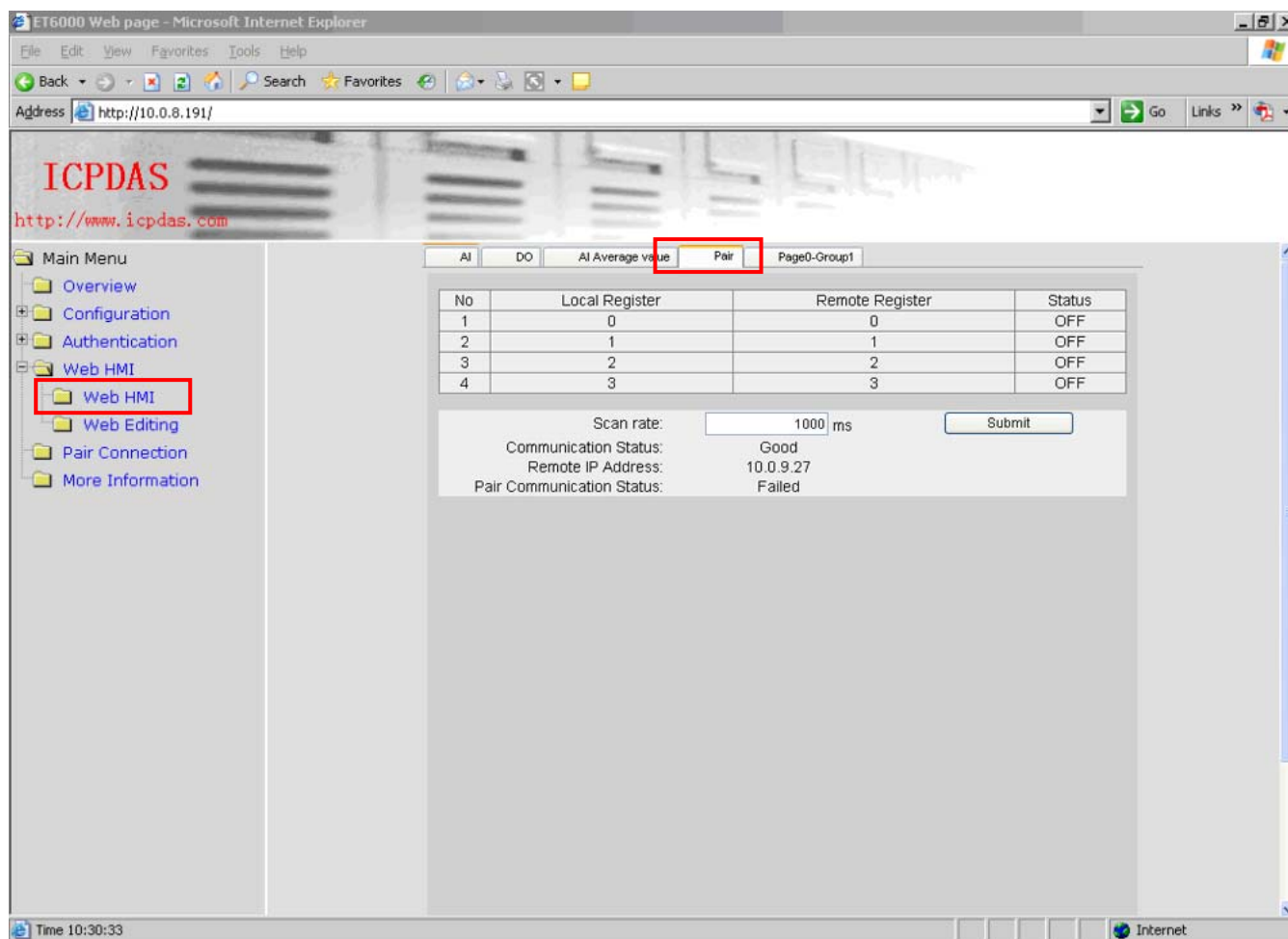
Modbus Settings			
Modbus port	<input type="text" value="502"/>		
<input type="checkbox"/> I/O Pair connection			
Remote IP address	<input type="text"/>	Remote Port	<input type="text" value="0"/>
Connection Timeout	<input type="text" value="0"/> ms	Re-Connection Time	<input type="text" value="0"/> ms
Net ID	<input type="text" value="0"/>	Scan Time	<input type="text" value="0"/> ms
Access Type	DO <input type="checkbox"/>		
Controller Memory	<input type="text" value="0"/>	Device Memory	<input type="text" value="0"/>
Count	<input type="text" value="0"/>	Receive Timeout	<input type="text" value="0"/> ms
Access Type	AO <input type="checkbox"/>		
Controller Memory	<input type="text" value="0"/>	Device Memory	<input type="text" value="0"/>
Count	<input type="text" value="0"/>	Receive Timeout	<input type="text" value="0"/> ms
<input type="button" value="Submit"/>			

Table 3-6 I/O Pair Connection Settings

Settings	Description	Range	Default
I/O Pair connection	Enable/Disable I/O pair connection	Enable, Disable	Disable
Remote IP	IP address of remote device	0~ 42949672965 ms	0
Remote TCP port	TCP listen port of remote device	0~65535	502
Remote Net ID	Modbus Net ID of remote device	0~255	1
Connection timeout	Timeout to build a connection.	0~ 42949672965 ms	5000 ms
Reconnect interval	Continue to attempt to reconnect to the remote module once the connection is lost until the reconnection time has expired.	0~ 42949672965 ms	10000 ms
Scan time	Time period to establish the communication	0~ 42949672965 ms	1000 ms
Communication timeout	Timeout for Modbus/TCP communication.	0~ 42949672965 ms	500 ms
Local DI base address	DI base address of local DI register that will be mapped to remote DO device.	Depend on the ET-7000	0
Remote DO base address	DO base address of remote DO device that will be mapped to local DI register.	Depend on remote device	0
I/O count	I/O count mapped from the base address	1~255	0

Chapter 3 Web Configuration Page

When the configuration is done, you can click “Pair” from “Web HMI” to open another page to view the pair connection again.

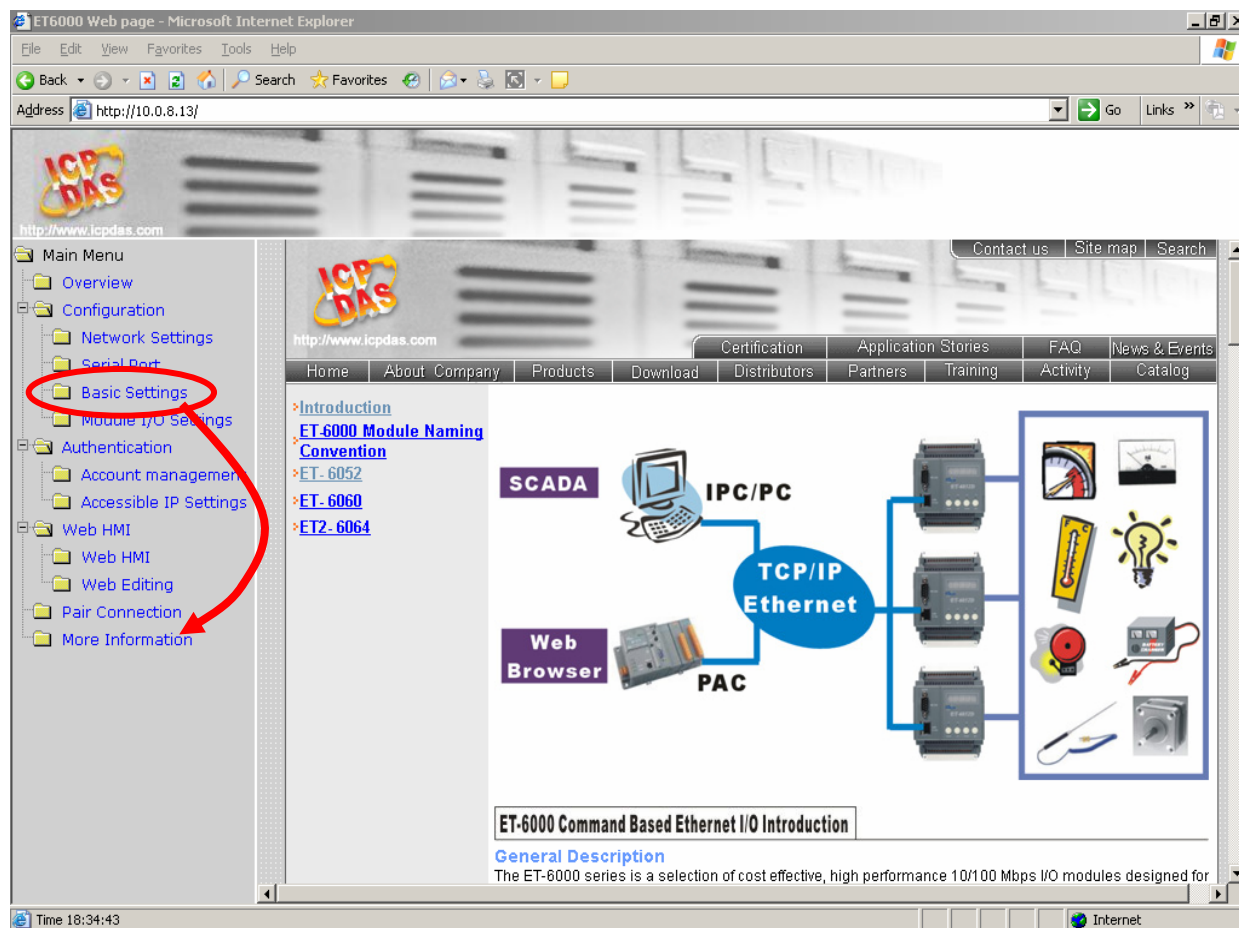


3.6. More Information

The More Information menu item is a Web page URL, and can be used to provide a link to a web site containing additional information about the product maker, detailed specs etc.

The Default More Information URL is: http://www.icpdas.com/products/Remote_IO/ET-7000/ET-7000_introduction.htm

Please refer to **Sec. 3.2.2 Basic Settings** for details of how to modify the URL.



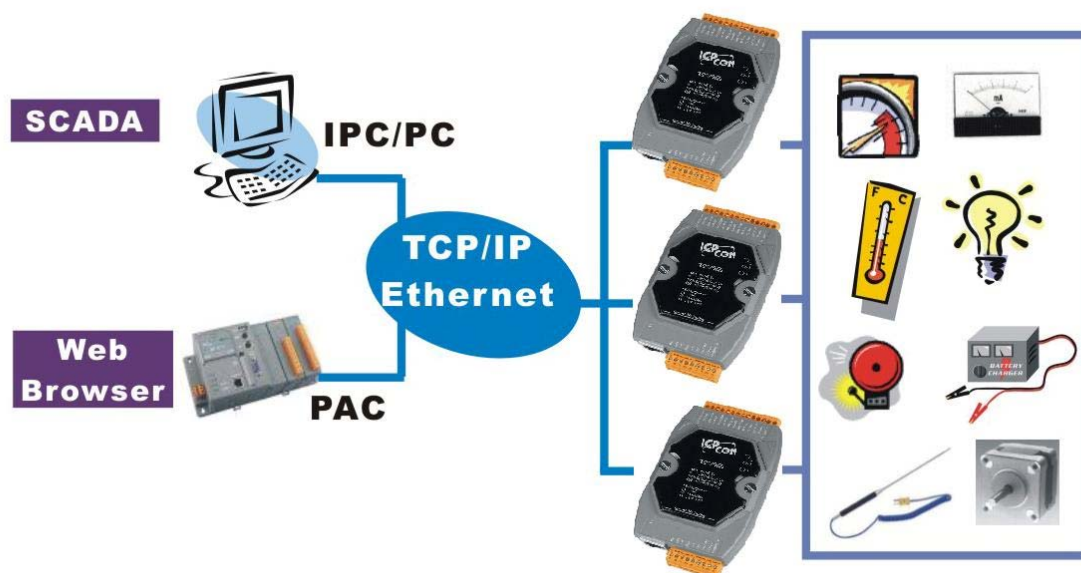
4. How to access ET-7000?

ET-7000 series is designed as remote I/O module that can be accessed via an Ethernet interface.

4.1. Via an Ethernet Network

Ethernet is an extremely popular networking format that already exists for most applications, either for use with local networks or for connecting to the Internet. A host PC or other devices on the LAN or WAN can be connected to access the ET-7000 module or control the devices attached on the COM1 of the ET-7000 module.

The Host PC is able to access the ET-7000 module using the Modbus/TCP.



Modbus/TCP Protocol

The Modbus/TCP protocol is a variant of the standard Modbus protocol. It was developed in 1999 to allow access to Ethernet devices by Internet community.

4.2. Using the Modbus protocol

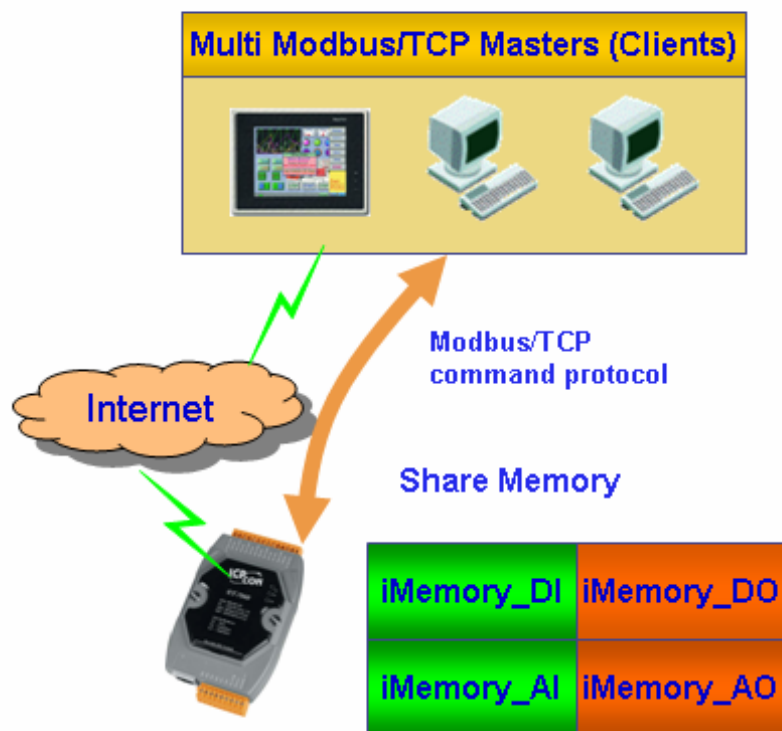
4.2.1. Introduction

MODBUS is a master-slave bus system in which only one device (the master) actively starts a transaction (query). The passive device (the slave) then sends a response. Most SCADA Supervisor Control And Data Acquisition and HMI software can easily integrate serial devices via the Modbus protocol, such as Citect, ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Trace Mode, Wizcon, Wonderware, etc.

Chapter 4 How to access ET-7000

The ET-7000 controller includes the Modbus/TCP protocol, which is a variation of the Modbus protocol that was developed in 1999 to allow the Internet community to access Ethernet devices.

Modbus address for Modbus/TCP client access.



4.2.2. Function Codes Supported

Modbus function codes are different both the analog and digital types.

Table 4-1 ET-7000 Modbus Function Code

Modbus Command (Hex)	Protocol Description
01	Read multiple coils status for DO
02	Read multiple input discrete for DI
03	Read multiple registers for AO
04	Read multiple input registers for AI
05	Write single coil for DO
06	Write single register for AO
0F	Force multiple coils for DO
10	Write multiple registers for AO

4.2.3. Modbus Register address table

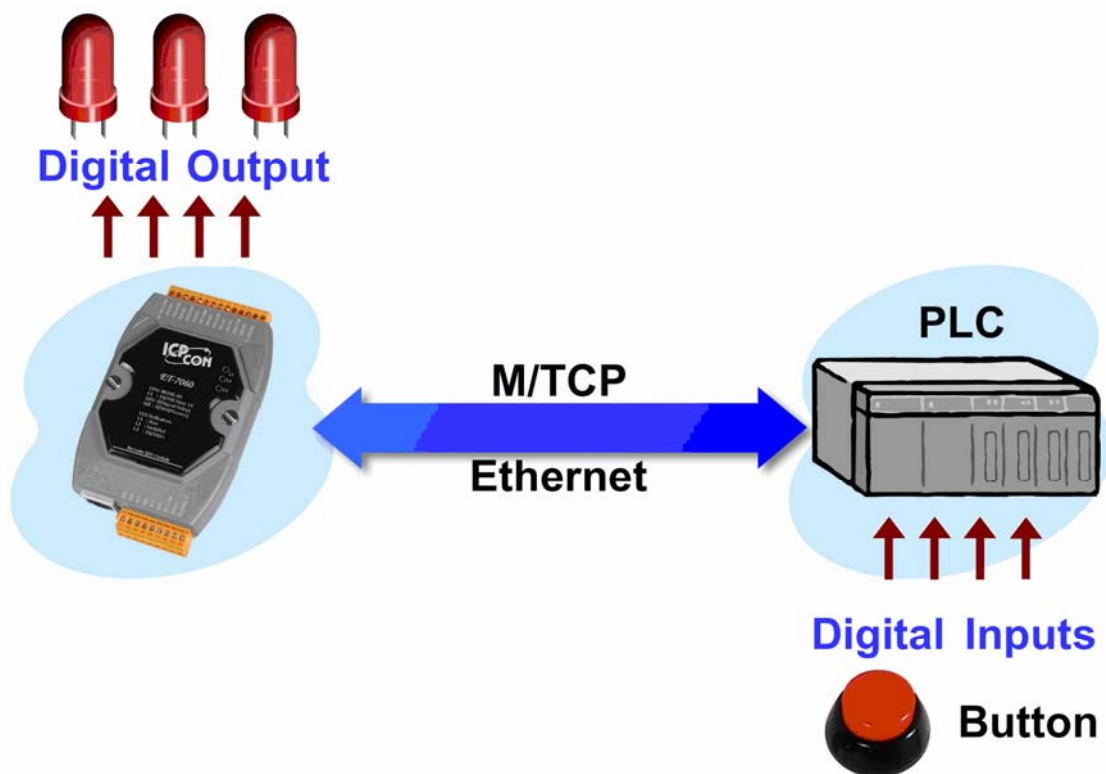
In addition to the Web Configuration Page, the custom's software that supports Modbus protocol can be used to issue Modbus command to the ET-7000 module.

For more details regarding the Modbus address of the ET-7000 module, please refer to Appendix C: Modbus Register Table.

5. I/O Pair Connection

The function is used to make a DI to DO pair through the Ethernet. The communication is based on Modbus/TCP. Once the configuration is done, the ET-7000 can poll remote DI status and then write to a local DO device constantly in the background.

Using the function, remote DI status can be transmitted to local DO device over the Ethernet without any programming skill.

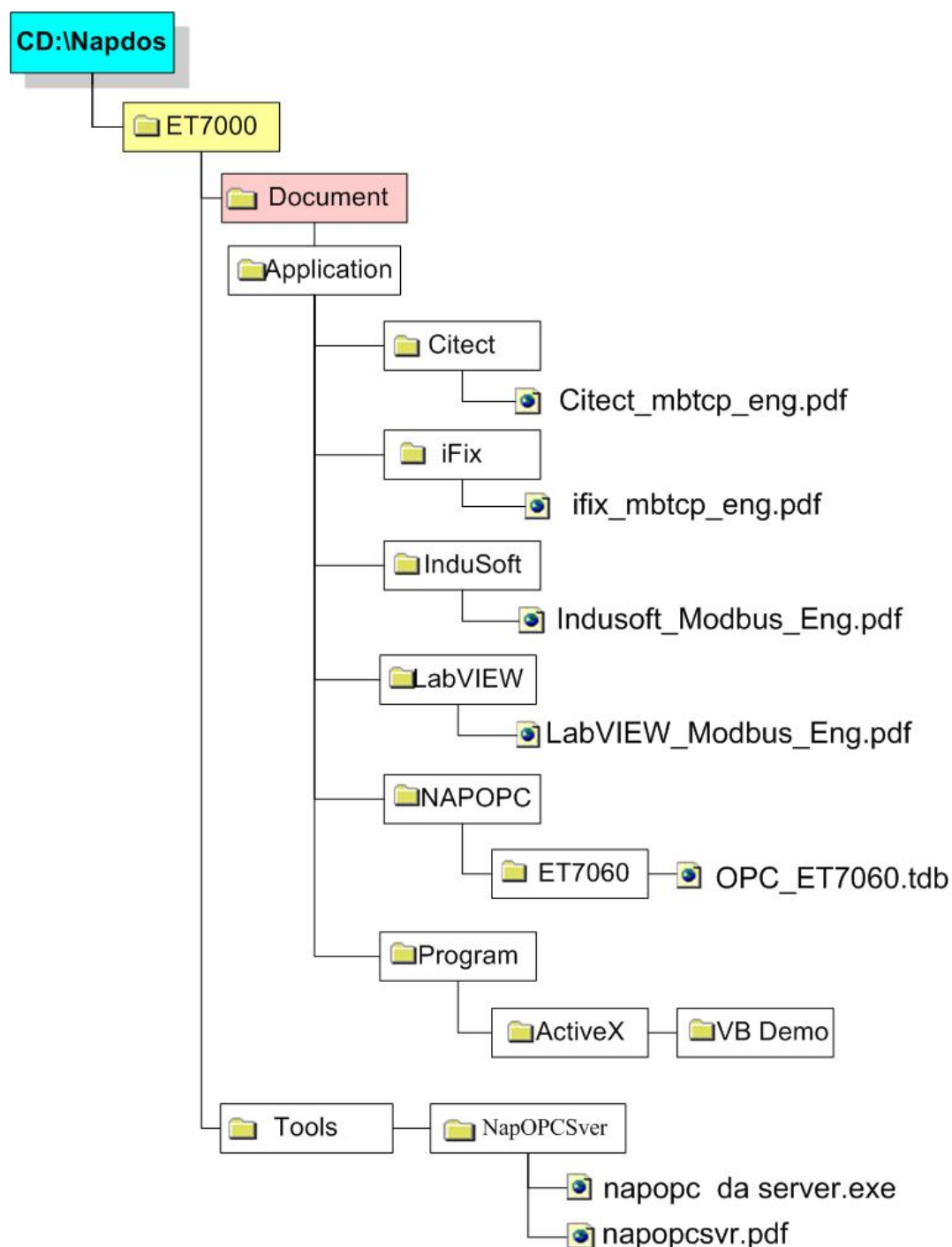


Please refer to **Sec. 3.5 Pair Connection** for more details regarding the configuration of the I/O pair connection.

6. Software Development Application

6.1. Location of documents and software

The following diagram illustrates the location of all documents and software related to Modbus applications for ET-7000 series modules. The relevant file can quickly be located by referring to the diagram.

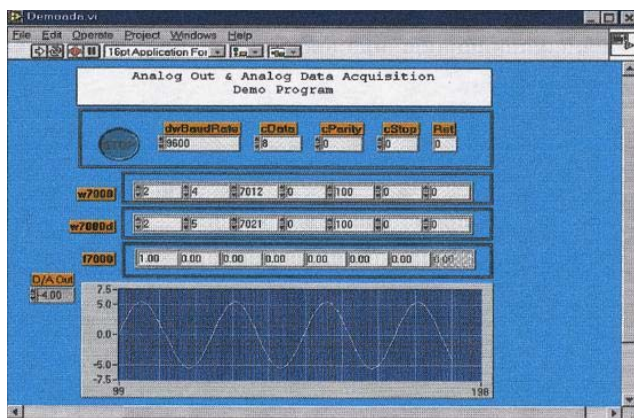


Chapter 6 Software Development Application

There are a variety of applications that conform to the Modbus protocol, such as ActiveX, LabVIEW, InduSoft, OPC Server, etc. are available for use on the/a Host PC. These applications can be used to access ET-7000 series module from the Host PC and contain a number of helpful free demo programs and documents, which can be found on the CD included in the shipping package, or can be downloaded from the ICP DAS web site or FTP site.

When planning the development of a system, appropriate software solutions should be chosen to suit different situations. The diagram (previous page) shows the relation between the software solutions. Refer to the diagram to determine a solution that meets your requirements.

6.2. LabVIEW



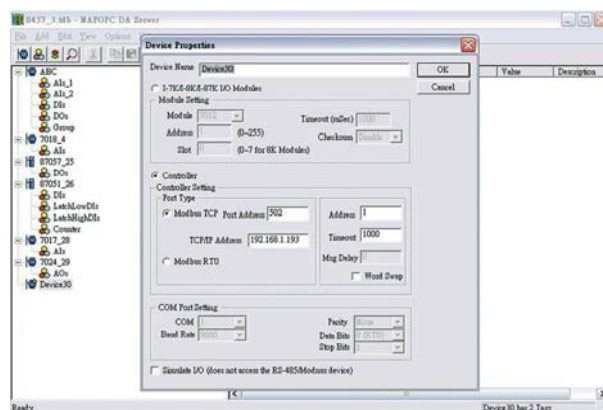
LabVIEW is the best way to acquire, analyze, and present data. LabVIEW delivers a graphical development environment that can be used to quickly build data acquisition quickly, instrumentation and control systems, boosting productivity and saving development time. With LabVIEW, it is possible to quickly create user interfaces that enable interactive control of software systems. To specify your system functionality, simply assemble block diagram – a natural design notation for scientists and engineers.

The document containing the detailed instructions for linking to the ET-7000 using the Modbus protocol is located on the shipped CD:

[\NAPDOS\ET7000\Document\Application\LabVIEW](#) or

<ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/et7000/document/application/labview>

7. OPC Server



7.1. Introduction

OPC (OLE for Process Control) is the first standard resulting from the collaboration of a number of leading worldwide automation suppliers working in cooperation with Microsoft. Originally based on Microsoft's OLE COM (Component Object Model) and DCOM (Distributed Component Object Model) technologies, the specification defines a standard set of objects, interfaces and methods for use in process control and manufacturing automation applications to facilitate interoperability.

There are many different mechanisms provided by various vendors that allow access to a variety of devices via specific applications. However, if an OPC server is provided for the device, other applications will be able to access the OPC Server via the OPC interface.

7.2. Procedure for using the OPC server

Step 1: Read the following documents

Readme.txt: contains the latest important information, including:

- A list of files contained on the shipped CD

Reversion.txt: contains the revision history information, including

- Bugs
- New modules supported

Step 2: Install the OPC server by executing:

CD:\NAPDOS\ET7000\Tools\Napotcsvr\NapOPCServer.exe

Note: If there is an older version of the Nap OPC Server installed on the PC, and must be uninstalled before installing the new version.

Step 3: Read the manuals describing how to begin.

The **NapOPCSvr.pdf** is the user's manual describing how to use the OPC server

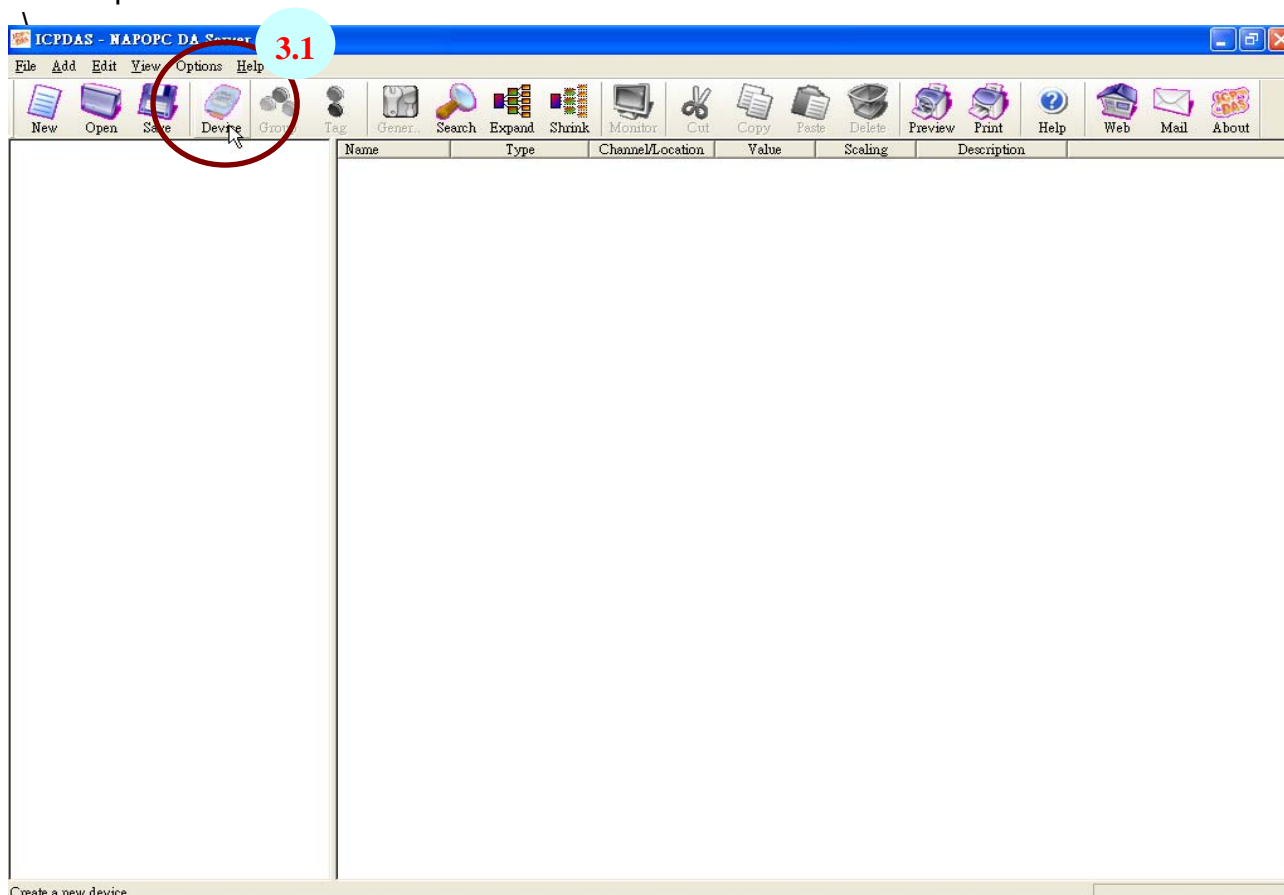
7.3. OPC Server Example using MODBUS protocol

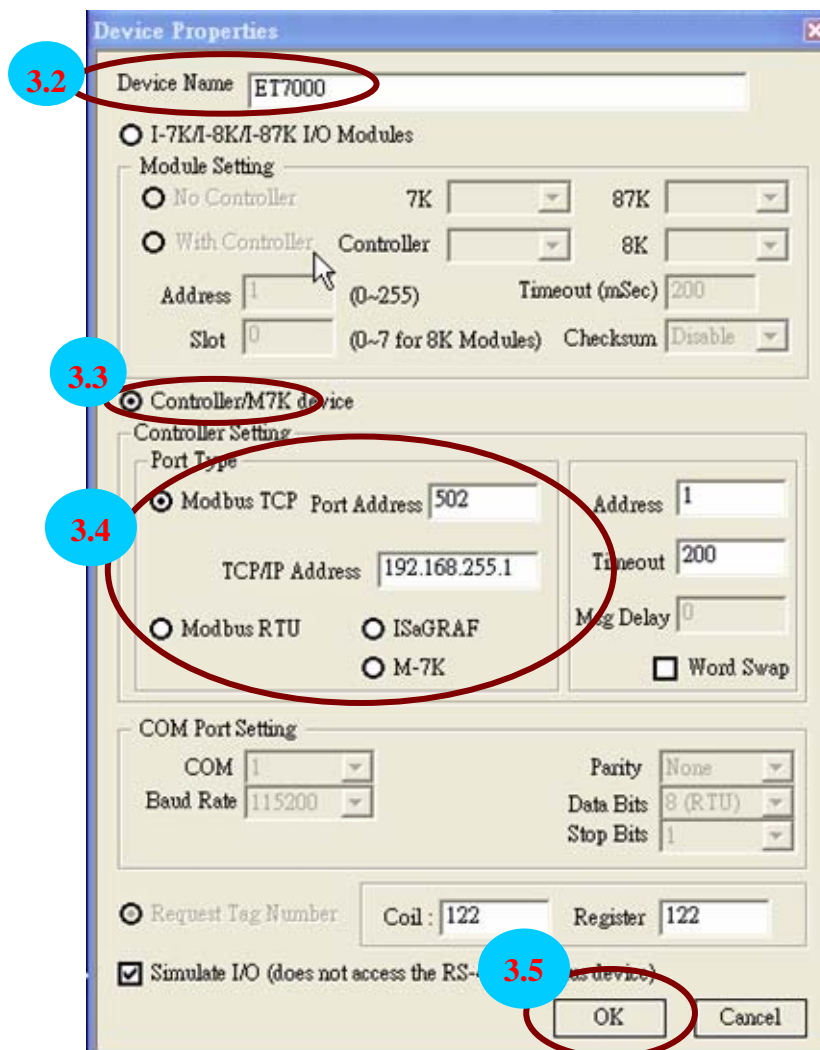
The following is an example of accessing Digital input and output values from an ET-7000

Step 1: Connect the ET-7000 controller (refer to **Sec. 1.5.2**) and configure its network settings (IP, Mask and Gateway - refer to **Sec. 2.1**)

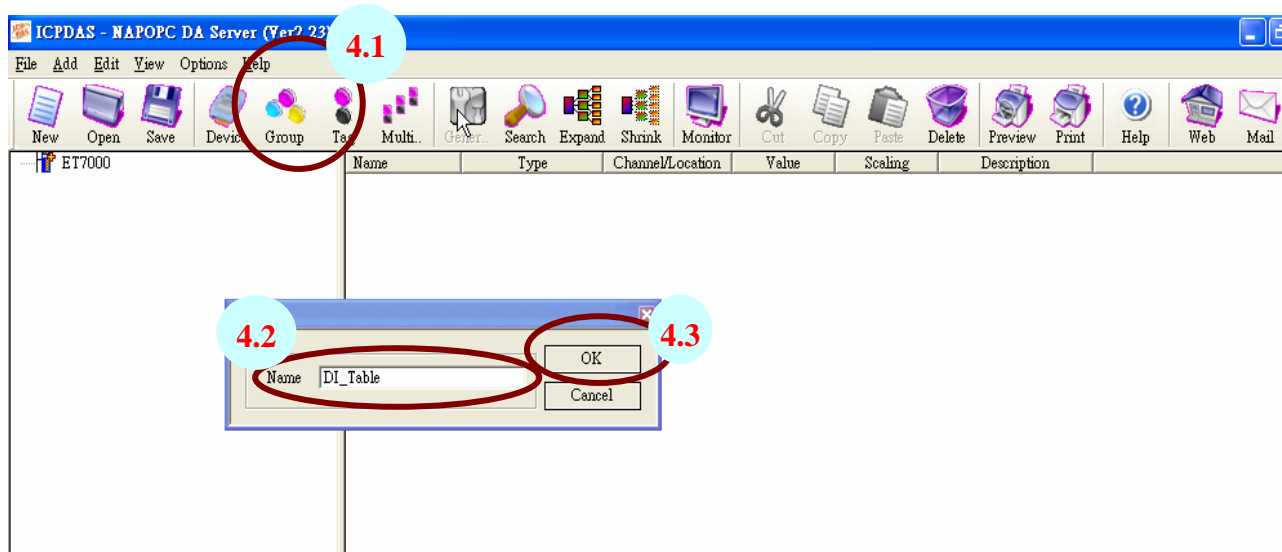
Step 2: Run the OPC server

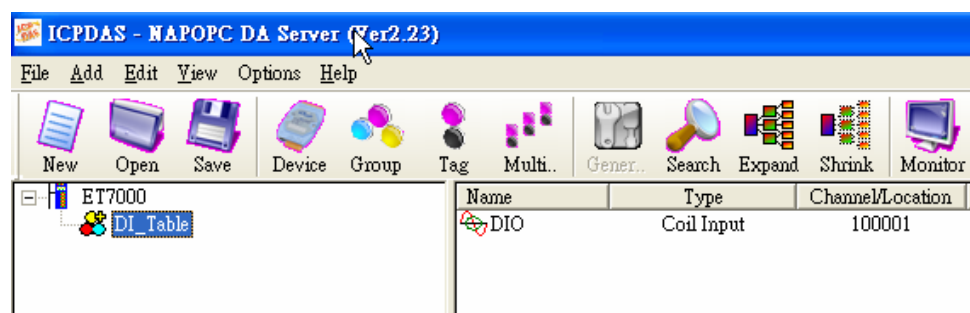
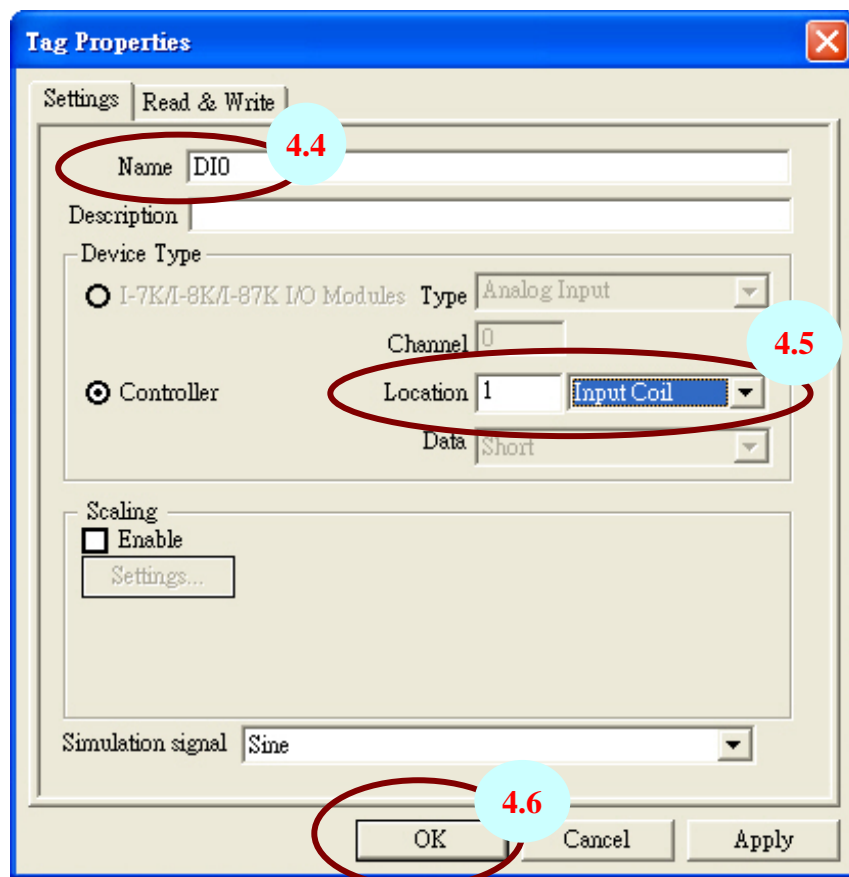
Step 3: Add/Create a new device and to search for I/O modules using Modbus /TCP protocol



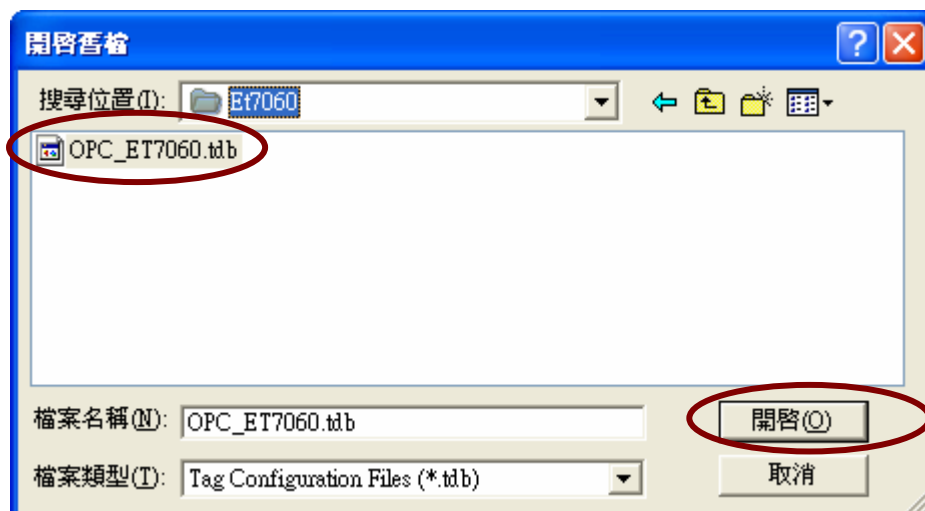


Step 4: New a Group and Tag

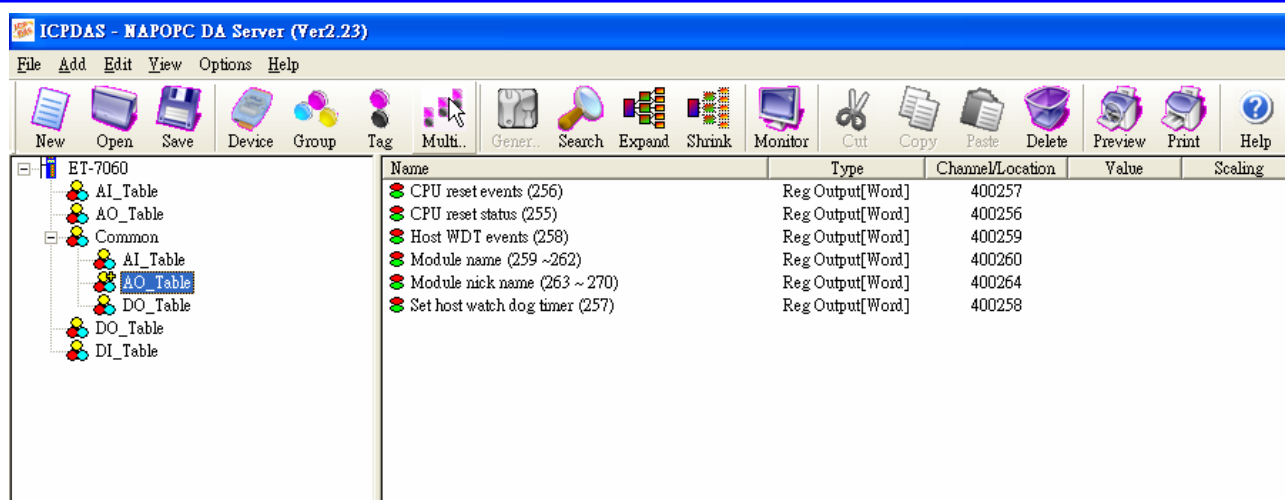




Step 5: Load a finished OPC project file for ET-7060



Chapter 7 OPC Server



Note:

1. The OPC file for the ET-7060 is located at:
CD:\NAPDOS\ET7000\Document\Application\NAPOPC\ET-7060

8. SCADA

SCADA stands for **S**upervisor **C**ontrol **A**nd **D**ata **A**cquisition. It is a production automation and control system based on PCs

SCADA is widely used in many fields e.g. power generation, water systems, the oil industry, and chemistry, the automobile industry. Different fields require different functions, but they all have the common features:

- Graphic interface
- Process mimicing
- Real time and historic trend data
- Alarm system
- Data acquisition and recording
- Data analysis
- Report generator

Accessing ET-7000 devices using SCADA software

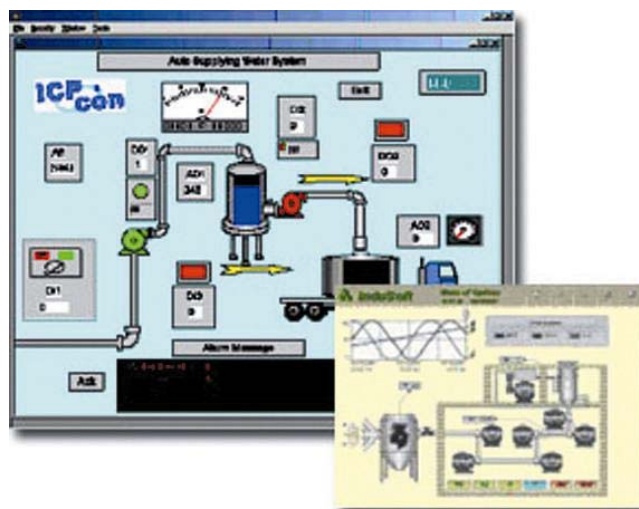
SCADA software is able to access ET-7000 devices using Modbus communication protocols, and can communicate without the need for other software drivers.

Famous SCADA software:

Citect, ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Trace Mode, Wizcon, Wonderware ... etc

In the following sections 3 popular **brands of** SCADA software are introduced together with the detailed instructions in how use them to communicate with ET-7000 series module using the Modbus/TCP protocol.

8.1. Indusoft



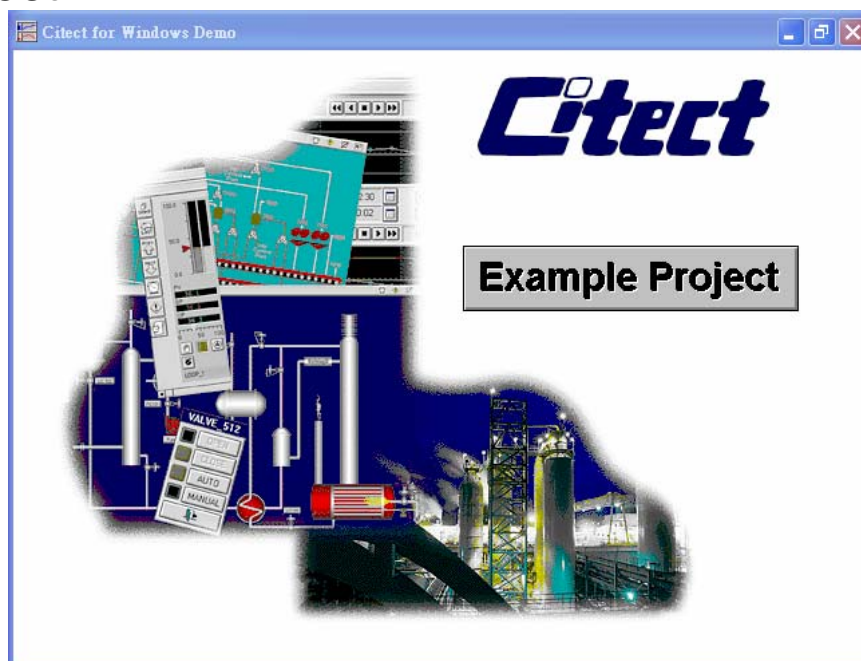
InduSoft Web Studio is a powerful, integrated collection of automation tools that includes all the building blocks needed to develop modern Human Machine Interfaces (HMI), Supervisory Control and Data Acquisition (SCADA) systems, and embedded instrumentation and control applications. InduSoft Web Studio's application runs in native Windows NT, 2000, XP, CE and CE .NET environments and conforms to industry standards such as Microsoft .NET, OPC, DDE, ODBC, XML, and ActiveX.

The document containing detailed instructions for linking to the ET-7000 module using the Modbus protocol is located on the shipped CD:

[\NAPDOS\ET7000\Document\Application\InduSoft](#) or

<ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/et7000/document/application/indusoft/>

8.2. Citect



CitectSCADA is a fully integrated Human Machine Interface (HMI) / SCADA solution that enables users to increase return on assets by delivering a highly scalable, reliable control and monitoring system. Easy-to-use configuration tools and powerful features enable rapid development and deployment of solutions for any size application.

The document containing detailed instructions for linking to the ET-7000 module using the Modbus protocol is located on the shipped CD:

[\NAPDOS\ET7000\Document\Application\Citect](#) or

<ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/et7000/document/application/citect/>

8.3. iFix



The document containing detailed instructions for linking to the ET-7000 module using the Modbus protocol is located on the shipped CD:

[\NAPDOS\ET7000\Document\Application\iFix](#) or

<ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/et7000/document/application/ifix/>

9. Troubleshooting and Technical Support

This chapter discusses methods of quickly diagnosing and fixing problems or errors without having to contact ICPDAS.

When troubleshooting the following problems, please make sure that the module is switched on, and confirm that the physical connections are correct (power cable, network cable and serial cable)

Note that some unexplained errors might be caused by duplicate IP addresses on the Network. Make sure that the IP address of your module is unique.

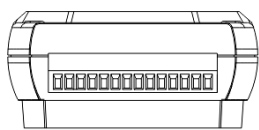
Table 9-1 Troubleshooting

Symptom/Problem	Possible cause	Solution
The RUN LED doesn't light	Internal power has failed	Return the module for repair.
The RUN LED indicator is ON (light), but not flashing.	The module has possibly crashed.	Reboot the module
Cannot communicate via the Ethernet port, but the ET-7000 is still operating.	The IP/Mask/Gateway address isn't within the IP address range of the LAN.	Change the IP/Mask/Gateway address to match the LAN, or ask the MIS administrator for assistance.
	The IP address has restricted by the IP filter settings	Check the IP filter setting using the Web configuration.
	There are more than 30 TCP/IP connections.	Reboot the module.
Able to explore the web page through port 80 using a web browser, but the Web HMI and Modbus/TCP program cannot access the module through port 502.	Port 502 has been restricted by the firewall.	Consult your MIS administrator for assistance.
The Web HMI and Modbus/TCP program can	The Port 502 has restricted by the firewall.	Consult your MIS administrator for assistance.

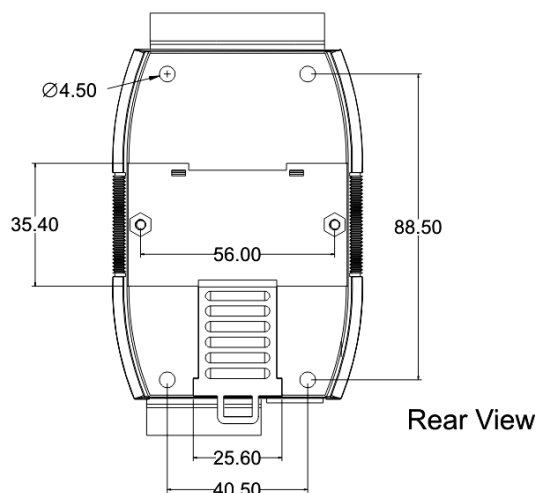
Chapter 9 Troubleshooting and Technical Support

	The Web Configuration function has been disabled. (Shown on the Basic Settings page)	Enable the Web Configuration function using either the SMMI or the console.
	The Web server TCP port has been changed from port 80 (Shown on the Basic Settings page)	Change the TCP port to 80 or reconnect the ET-7000 using the specific TCP port.

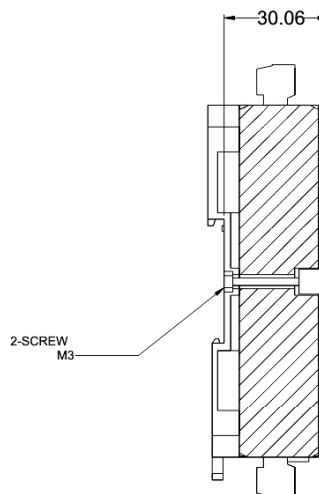
Appendix A: Dimensions



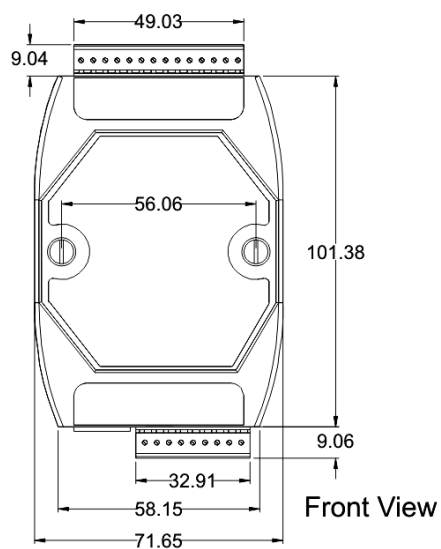
Top View



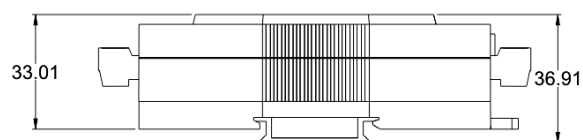
Rear View



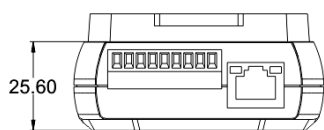
Unit: mm



Front View

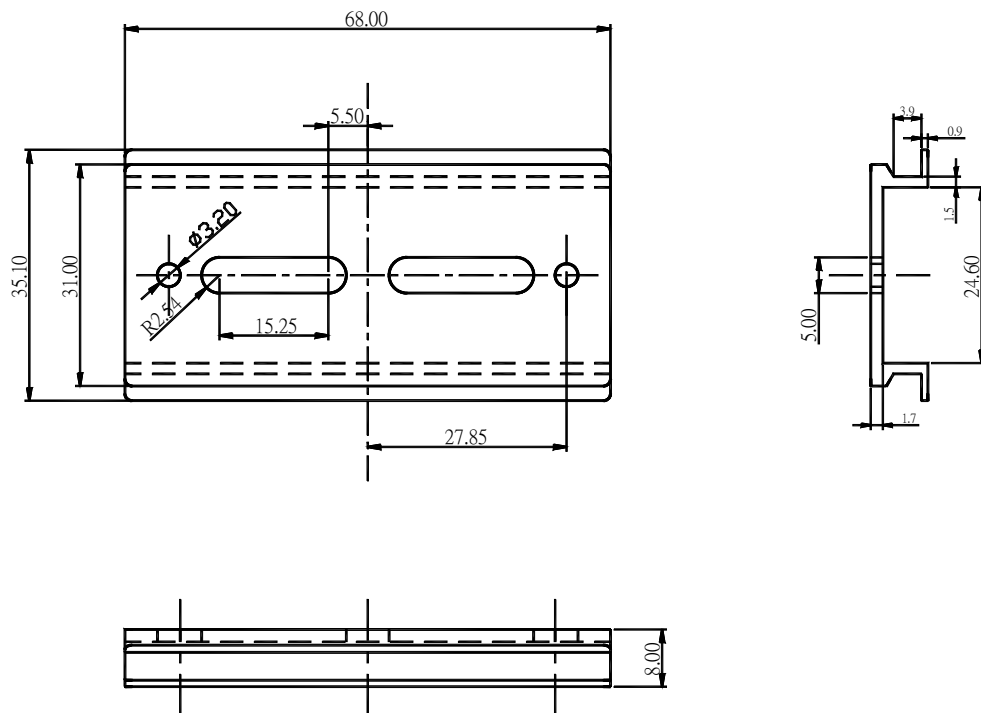


DIN-RAIL MOUNTING
BRACKET



Top View

Wall Mount Bracket



Appendix B: MiniOS7 Utility

On occasions, ICPDAS will offer an update to the ET-7000 firmware or MiniOS7. The MiniOS7 utility is used to easily update your software to the latest version. The **MiniOS7 Utility** is used for both essential configuration and for downloading programs into the ET-7000 controller embedded in the ICPDAS MiniOS7 environment.

The **MiniOS7 Utility** program provides 3 main functions:

- Update the MiniOS7 image
- Download firmware to Flash memory
- Configure Ethernet and COM port settings

MiniOS7 Utility location

The MiniOS7 utility is located in the

- CD:\NAPDOS\ET7000\Tools\Tools for MiniOS7\MiniOS7_utility folder on the enclosed CD or from
- [ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/et7000/tools/tools for minios7/minios7_utility/](ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/et7000/tools/tools%20for%20minios7/minios7_utility/)

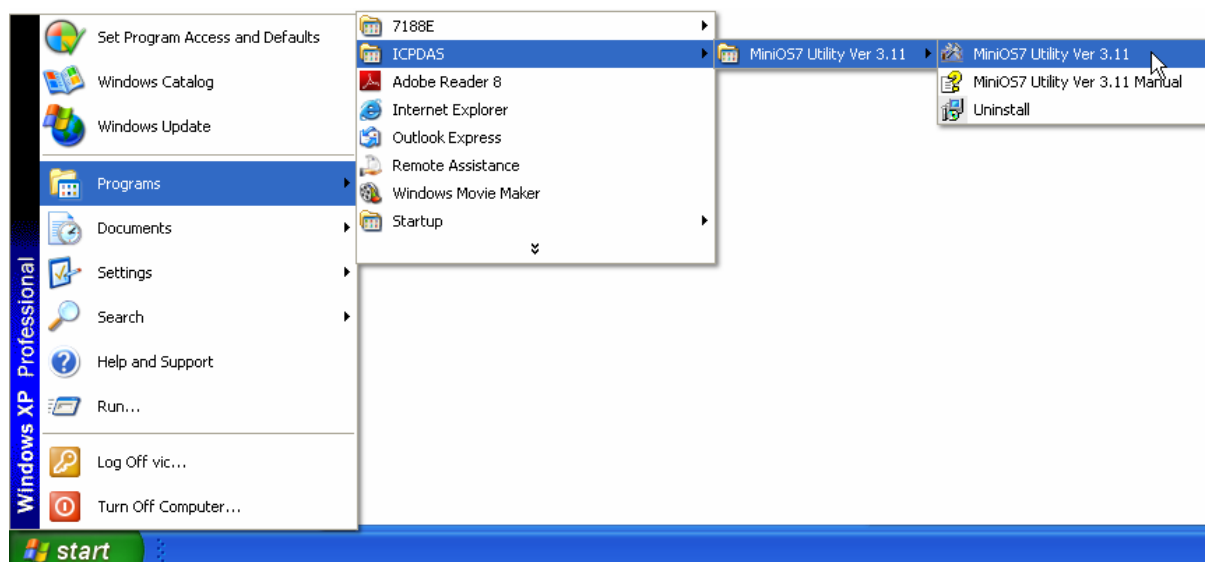
Appendix B: MiniOS7 utility

Installation procedure

Step 1: Locate and run MiniOS7utility.exe from the CD:
\\NAPDOS\ET7000\Tools\Tools for MiniOS7\MiniOS7_utility directory.

Step 2:

After completing the installation, a new “ICPDAS” folder will be added to the “programs” section of the start menu. The MiniOS7_utility files can be accessed by clicking on this folder and then the '**MiniOS7 utility**' folder. See the diagram below for details.

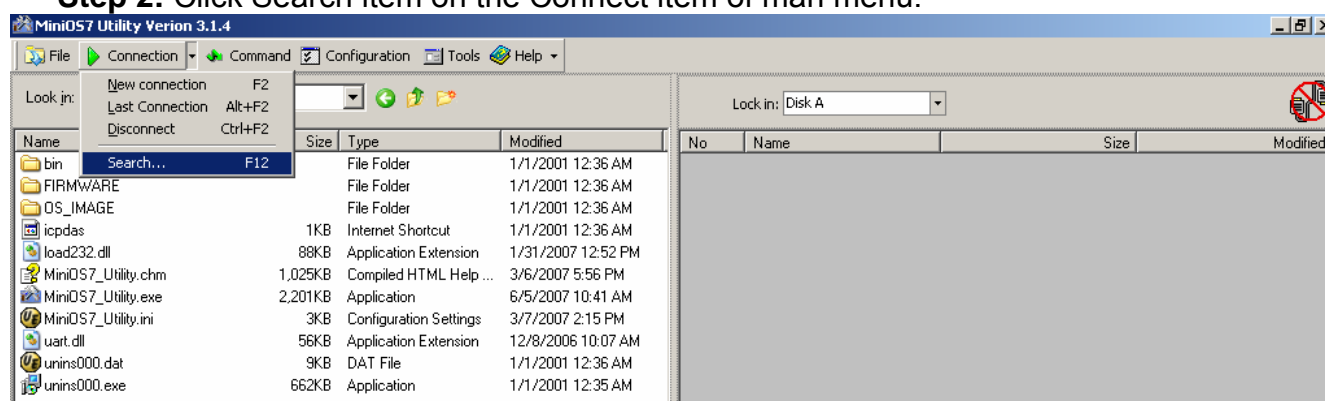


Downloading firmware to the ET-7000 controller

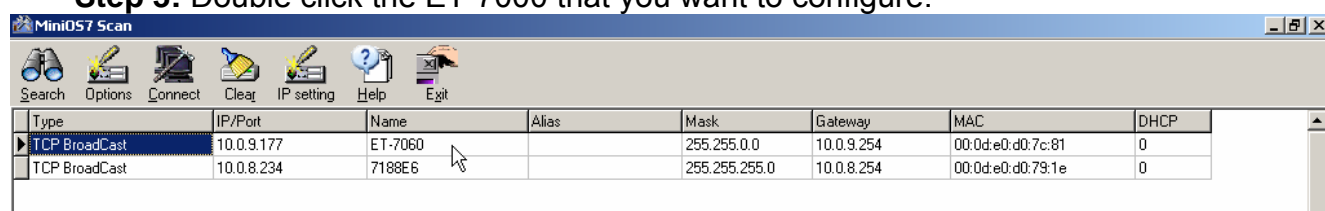
The download procedure is as follows:

Step 1: From the Windows START menu, navigate to programs/ICPDAS/MiniOS7 Utility and locate the **MiniOS7 utility** program.

Step 2: Click Search item on the Connect item of man menu.

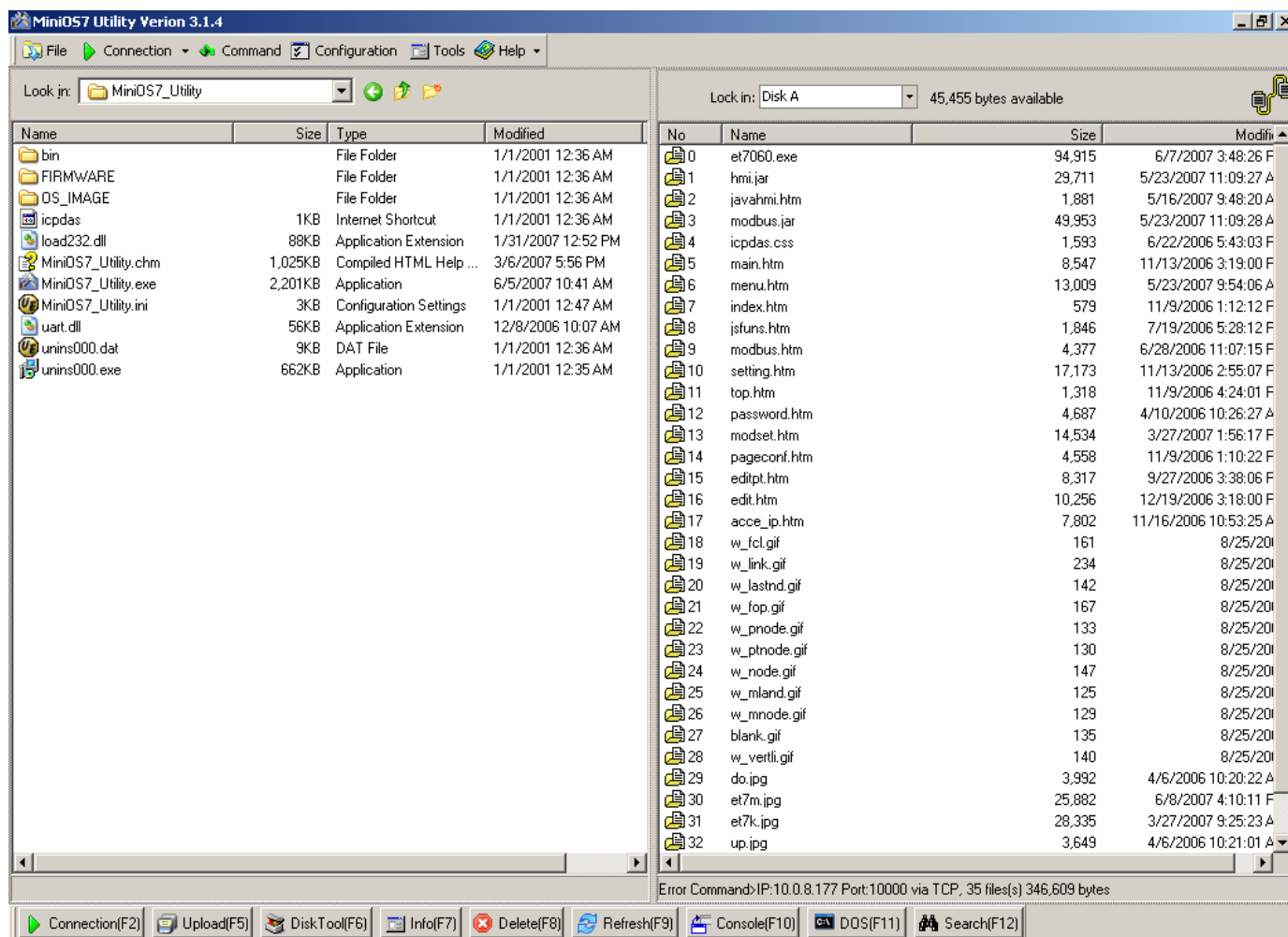


Step 3: Double click the ET-7000 that you want to configure.



Appendix B: MiniOS7 utility

Step 3: After a connection between the ET-7000 and PC has been successfully established, the following screen will be displayed. (The total files on the selected ET-7000 shows on the file list of right hand window)



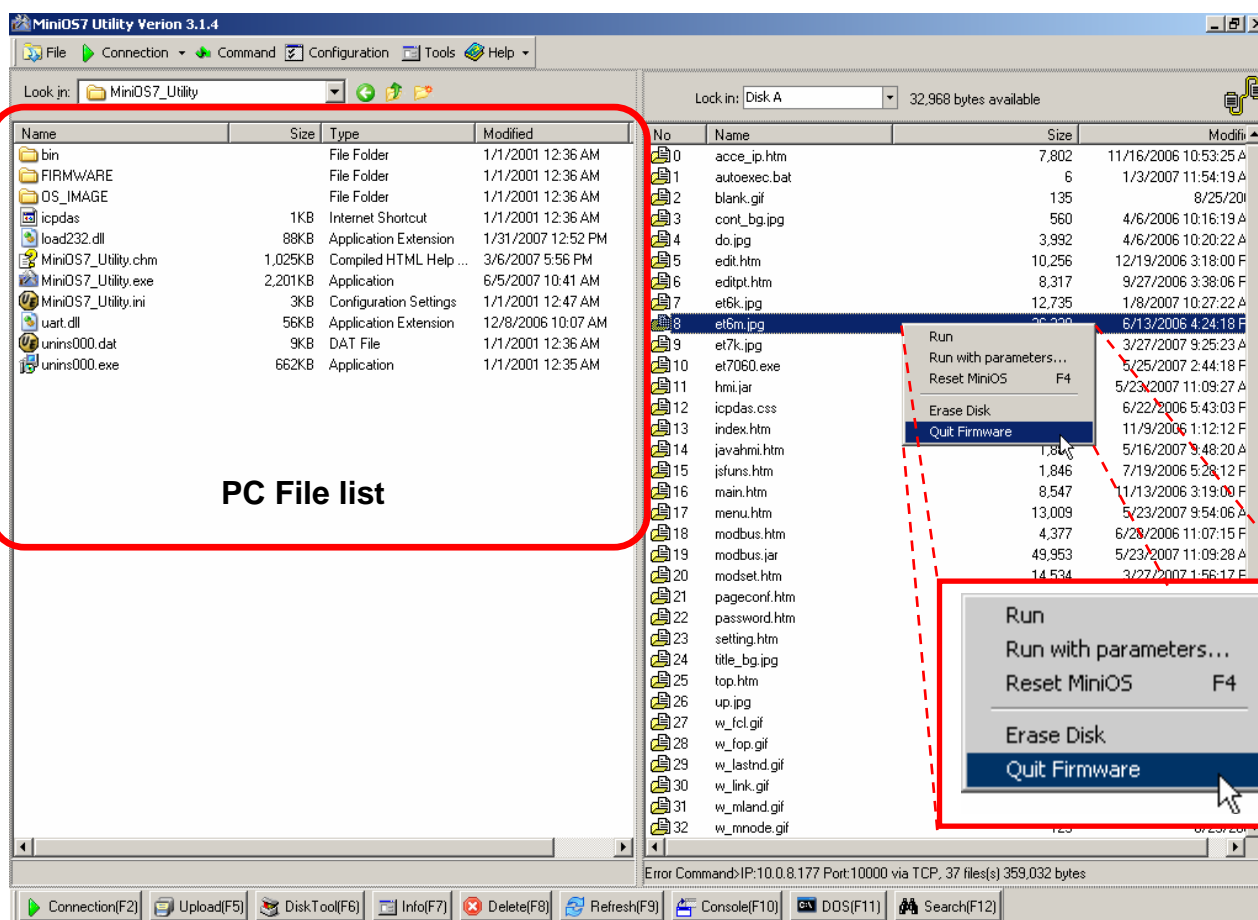
Step 4: Right Click the file list on the right hand window and then click **Quit Firmware** item from TCP/IP mode to UDP mode.



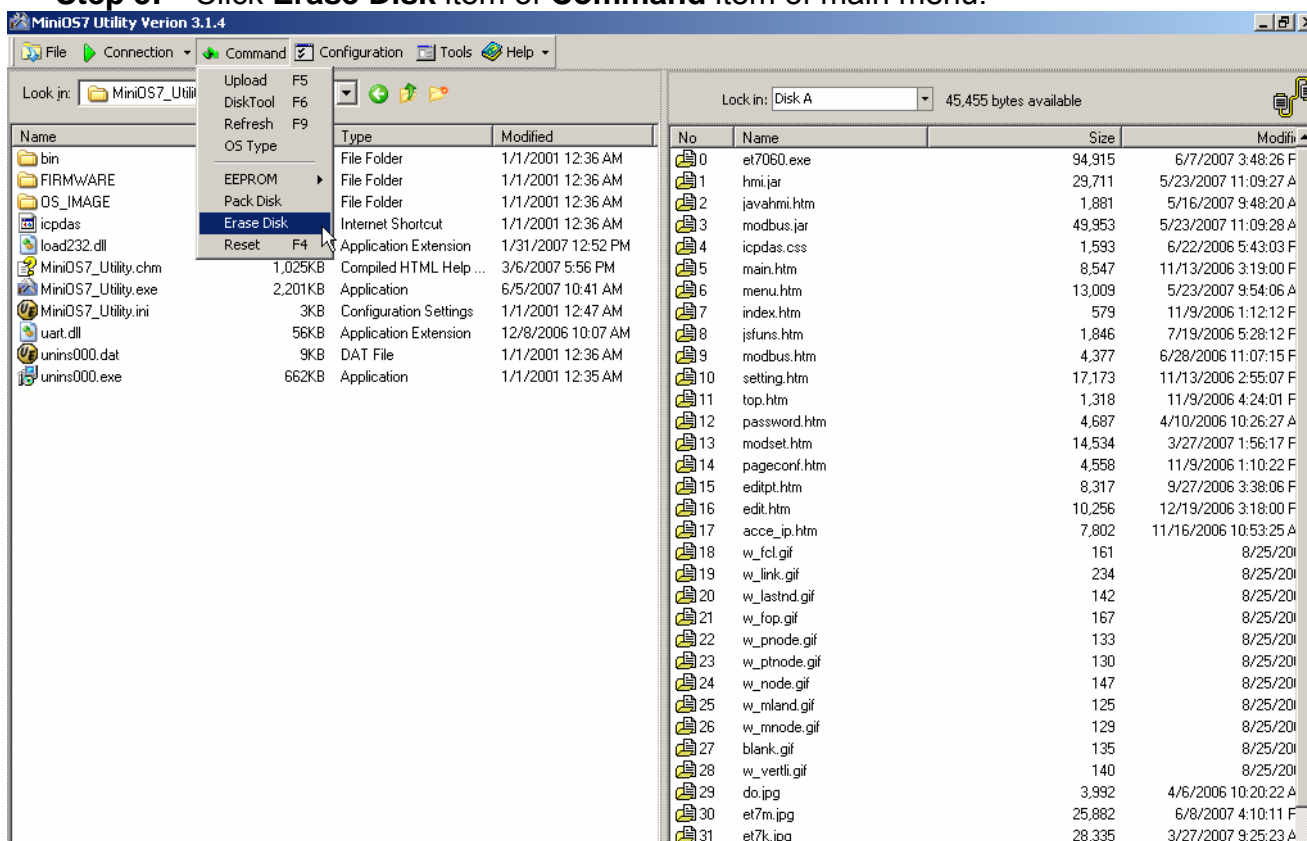
Notes:

- The default firmware of ET-7000 series module is TCP/IP mode that uses the TCP/IP protocol for communication. The Modbus/TCP protocol or Web communication are constructed on this communication layer.
- The UDP mode is used to update the firmware and MiniOS7 image.

Appendix B: MiniOS7 utility

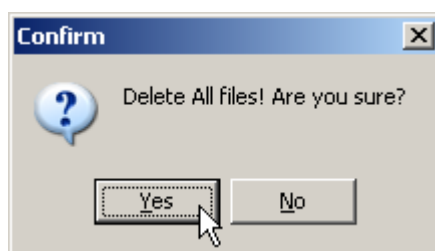


Step 5: Click Erase Disk item of Command item of main menu.

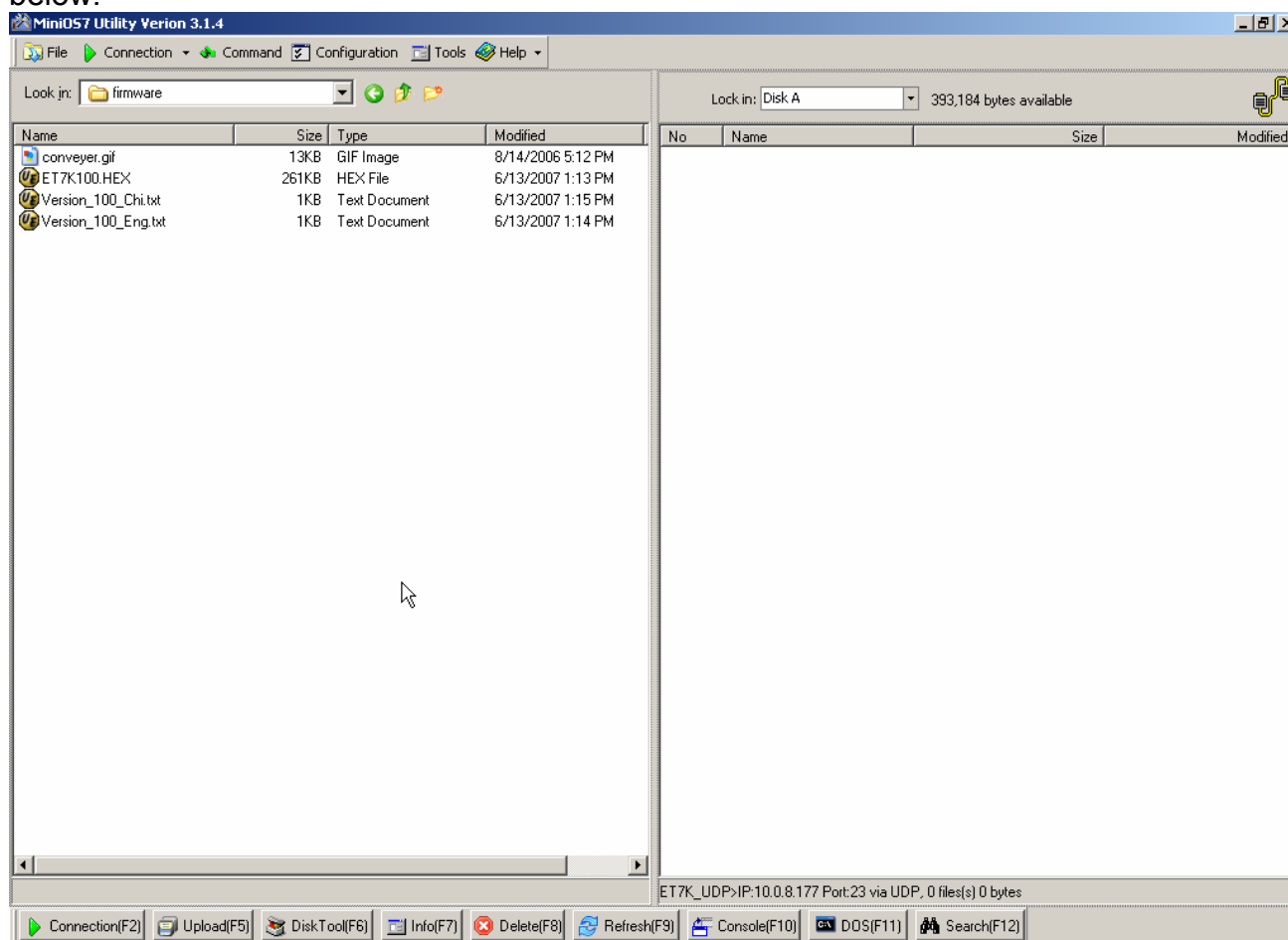


Appendix B: MiniOS7 utility

Step 6: A Confirm dialog notices whether all files will be deleted or not.



If Press “**Yes**” button, all files on ET-7000 will be deleted. Please refer to the picture below.



Notes:

- Before updating the firmware, you must delete all files existed on the ET-7000.

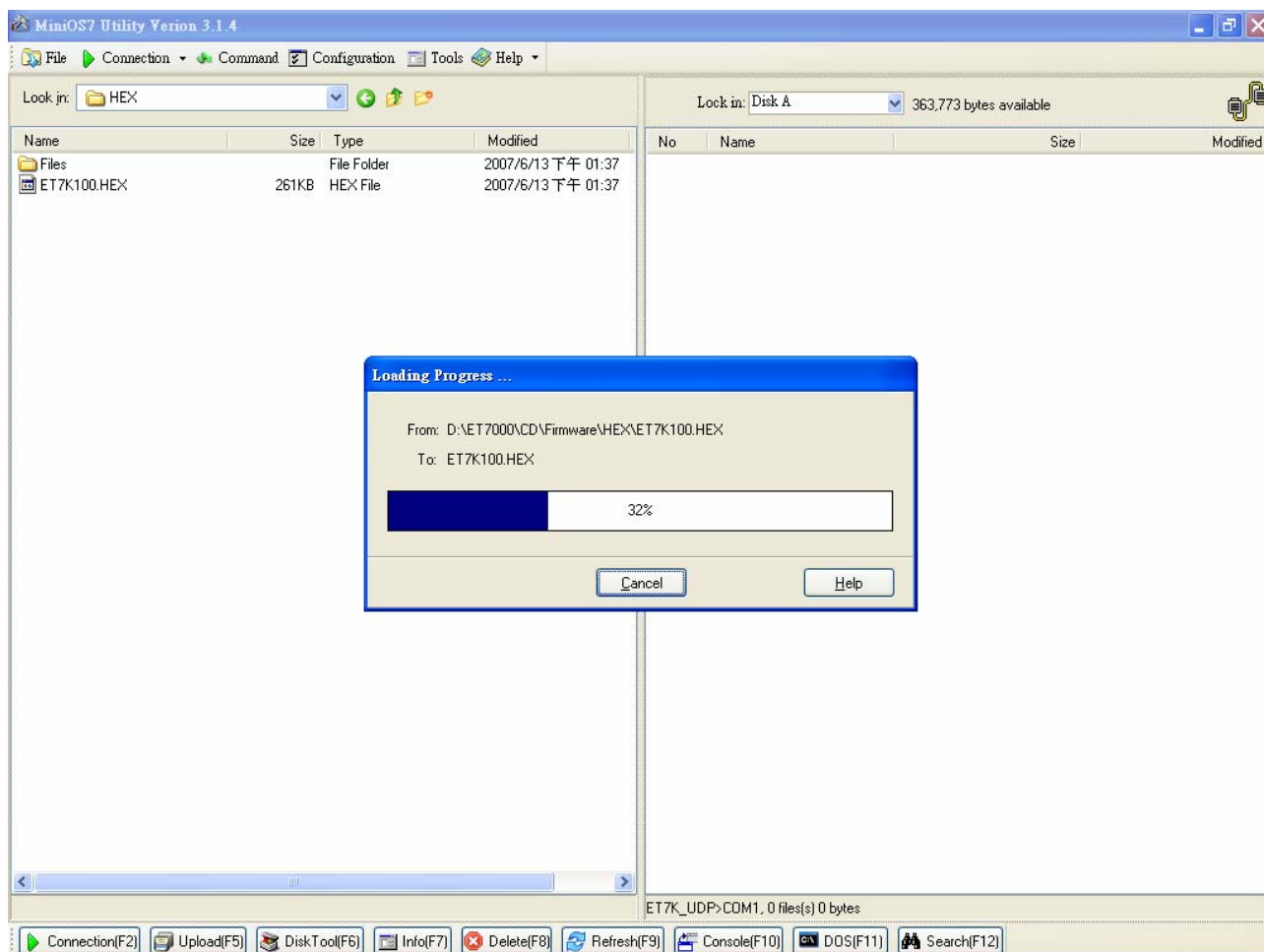
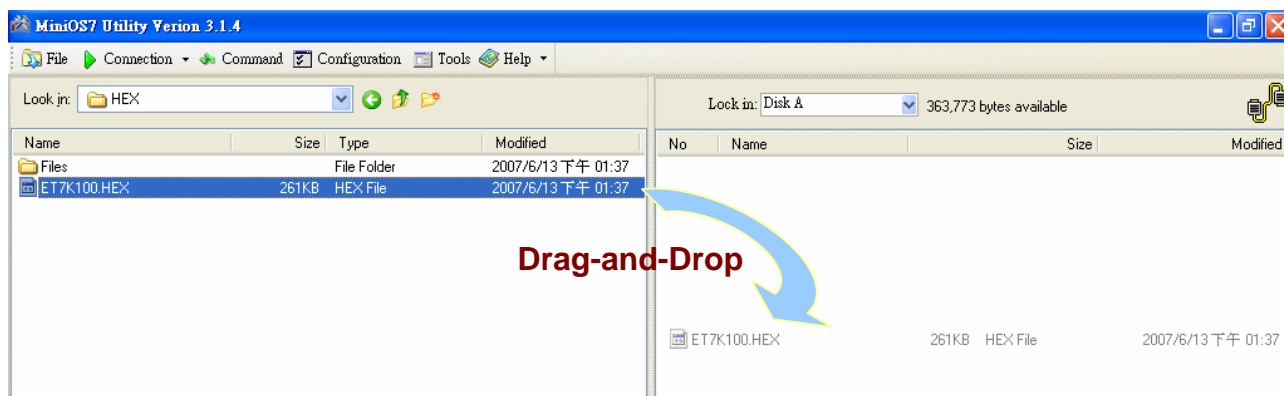
Step 5: Locate the required file in the left hand window, then drag and drop this file to the ET-7000. The figure below shows that the ET-7000 firmware has been downloaded to the ET-7000 module.

Appendix B: MiniOS7 utility



Notes:

- The ET-7000 firmware is a file named ET7Knnn.HEX, where 'nnn' is the version number.
- The MiniOS7 utility is only a tool for the ET-7000 series module to update its firmware, and the version of MiniOS7 utility must be V3.14 or later





Notes:

- To select multiple files, press and hold the CTRL or SHIFT keys while making your/a selection and drag them to simultaneously download the files to ET-7000
- After completing the download, turn off the power to the ET-7000 and then turn it back ON. This will cause the program to begin running the autoexec.bat (the content of the autoexec.bat indicates which file in the ET-7000 will run after rebooting). Alternatively, click the button to execute it.
- Please refer to the MiniOS7 utility help file for more details regarding the use of the MiniOS7 utility. This file is located in the ICPDAS MiniOS7_utility group in the 'Start' menu, or can be accessed by clicking the icon at the top of the MiniOS7 Utility toolbar.

Appendix C: MODBUS Register Tables

Modules Supported (ET-7000 series)			
Name	Date	Firmware	Note
ET-7015	Apr / 2009	V1.01	7-ch RTD input
ET-7017	Jan / 2009	V1.10	4-ch DO and 8-ch AI
ET-7017-10	Jan / 2009	V1.10	10-ch differential or 20-ch single-ended AI
ET-7018Z	Apr / 2009	V1.02	10-ch differential and 6-ch DO

Appendix C: Modbus Register Tables

C-1. Common Functions for all ET-7000 series modules

(0xxxx) DO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
226	1	Recover all I/O default settings	1	1=recover	W (Pulse)
233	1	Reboot ET-7000	1	1=reboot	W (Pulse)

(3xxxx) AI address					
Begin address	Points	Description	Registers per Point	Range	Access Type
350	1	OS image version	1	123 (hex) means version=1.2.3	R
351	1	Total Firmware version	1	123 (hex) means version=1.2.3	R
358	1	Modbus communication status	1	0= No Error -1= CRC error -2= Timeout	R
360	1	Pair Connection	1	0=Normal 1=Timeout 2=Disconnected	R

(4xxxx) AO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
555	1	CPU reset status	1	1= by power on 2= by 0.8 second WDT 3= by Reset command	R/W
556	1	CPU reset events	1	How many CPU reset events has happened? When CPU is reset by one of the situations described in register 555, the event increases one count.	R/W/E
557	1	Set host watch dog timer	1	<5: Disabled 5~65535: Enabled (unit: second) (default=0) When ET-7000 loses communication with PC more than the WDT setting, DO and AO go to their safe values and host WDT events plus 1 count.	R/W/E
558	1	Host WDT events	1	How many host WDT events have happened after CPU reset?	R/W
559	1	Module name	4	16 ASCII characters	R
563	1	Module nick name	8	16 ASCII characters	R/W/E

Appendix C: Modbus Register Tables

C-2. ET-7017 I/O Address Mapping



Appendix C: Modbus Register Tables

Detailed Modbus Address Table for ET-7017 (D)

(0xxxx) DO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
0	4	Digital Out	1	0=off 1=on	R/W
162	32	Clear AI Latch High	1	1=clear	W (Pulse)
194	32	Clear AI Latch Low	1	1=clear	W (Pulse)
347	1	Enable the average value of the previous AI values of one channel for all AI	1	0=disable 1=enable (Default=0)	R/W/E
348	1	Enable average of all enable channel, High/Low Alarm value of all AI average value and Average latched values for all AI channels	1	0=disable 1=enable (Default=0)	R/W/E
431	1	Write DO Power on value to EEPROM	1	1=write	W (Pulse)
432	1	Write DO Safe value to EEPROM	1	1=write	W (Pulse)
435	4	Power on value for DO	1	0=off 1=on (Default=0)	R/W/E
515	4	Safe value for DO	1	0=off 1=on (Default=0)	R/W/E
595	8	Enable/Disable AI channel	1	0=disable 1=enable (Default=1)	R/W/E
628	1	Normal/Fast mode for AI	1	0=normal (16 bit) 1=fast (12 bit) (Default=0)	R/W/E
629	1	50/60Hz rejection for AI	1	1=50Hz 0=60Hz (Default=0)	R/W/E
631	1	AI data format	1	1=engineering 0=hex (Default=0)	R/W/E
632	1	Return the factory calibration (All)	1	1=clear	R/W/E
634	1	Clear AI Latch High (All)	1	1=clear	W (Pluse)
635	1	Clear AI Latch Low (All)	1	1=clear	W (Pluse)
636	8	AI Alarm High switch	1	0=disabled 1=enabled	R/W/E
668	8	AI Alarm Low switch	1	0=disabled 1=enabled	R/W/E
700	8	AI Alarm High mode	1	0=Moment 1=Latched	R/W/E
732	8	AI Alarm Low mode	1	0=Moment 1=Latched	R/W/E
764	8	AI High Alarm	1	0=OK 1=alarm (Clear)	R/W (Pulse)
796	8	AI Low Alarm	1	0=OK	R/W (Pulse)

Appendix C: Modbus Register Tables

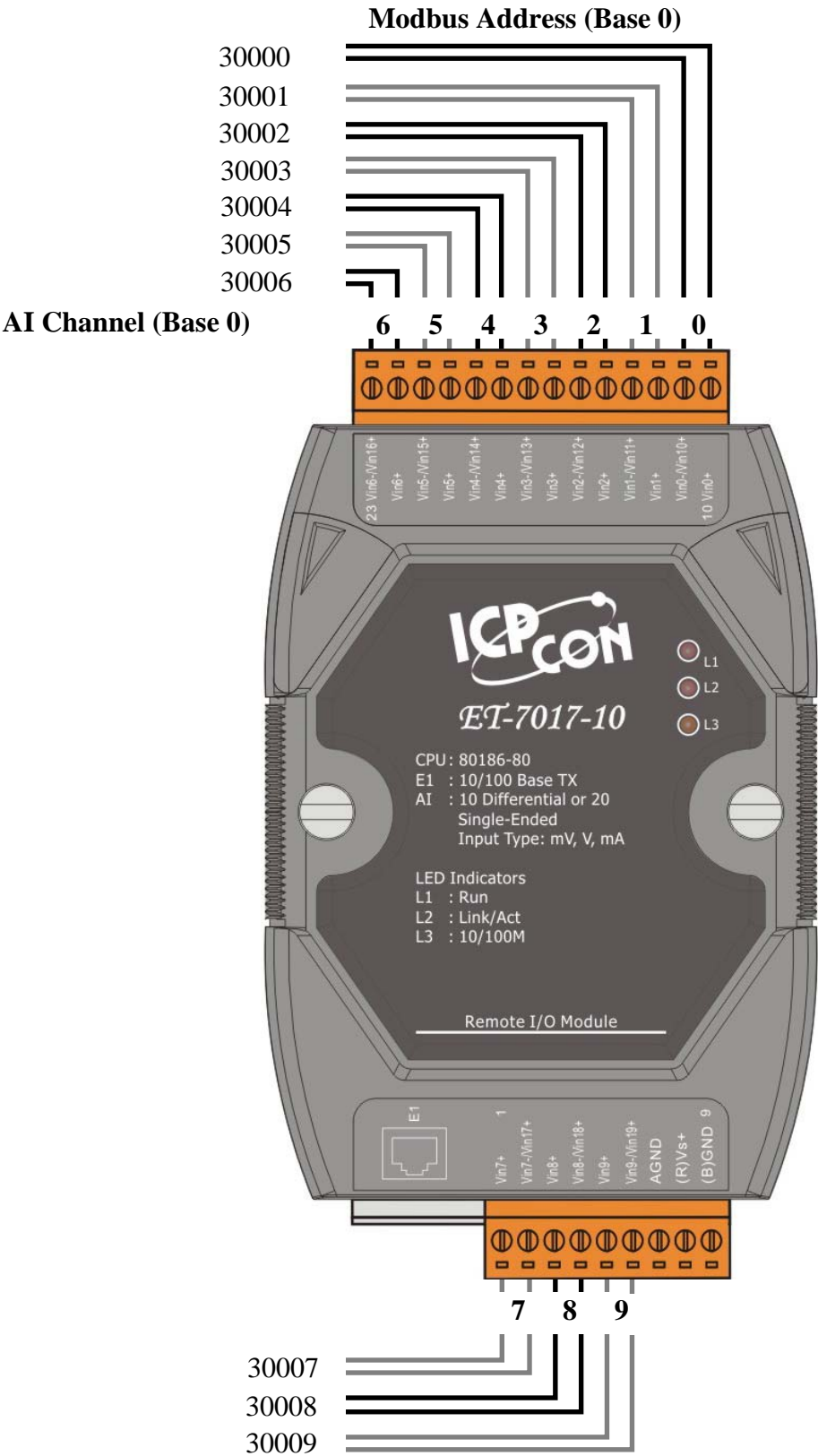
				1=alarm (Clear)	
828	1	High Alarm of Average value of all AI channel	1	0=OK 1=alarm (Clear)	R/W (Pulse)
829	1	Low Alarm of Average value of all AI channel	1	0=OK 1=alarm (Clear)	R/W (Pulse)

(3xxxx) AI address					
Begin address	Points	Description	Registers per Point	Range	Access Type
0	8	Analog Input	word	-32768 ~ +32767	R
144	8	Average value of one channel	word	-32768 ~ +32767	R
176	1	Average value of all enabled AI channel	word	-32768 ~ +32767	R
177	1	Average value of all maximum latched AI value	word	-32768 ~ +32767	R
178	1	Average value of all minimum latched AI value	word	-32768 ~ +32767	R
236	8	Analog Latched value (High)	word	-32768 ~ +32767	R
268	8	Analog Latched value (Low)	word	-32768 ~ +32767	R
310	1	DO (channel number)	word	0 ~ 79	R
311	1	Power on value for DO (channel number)	word	0 ~ 79	R
312	1	Safe value for DO (channel number)	word	0 ~ 79	R
320	1	AI (channel number)	word	0 ~ 16	R

(4xxxx) AI address					
Begin address	Points	Description	Registers per Point	Range	Access Type
59	1	Average times for every channel	word	0 ~ 40	R/W/E
174	1	Enable/Disable AI channel	word	0 ~ 65535	R/W
198	1	High alarm value for average value of all AI channel	word	0 ~ 65535 or -32768 ~ +32767	R/W/E
199	1	Low alarm value for average value of all AI channel	word	0 ~ 65535 or -32768 ~ +32767	R/W/E
296	8	High alarm value for AI	word	-32768 ~ +32767 (Default=32767)	R/W/E
296	8	Low alarm value for AI	word	-32768 ~ +32767 (Default=-32768)	R/W/E
427	1	Type code for AI	word	Refer to type code table	R/W/E

Appendix C: Modbus Register Tables

C-3. ET-7017-10 I/O Address Mapping



Appendix C: Modbus Register Tables

Detailed Modbus Address Table for ET-7017-10

(0xxxx) DO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
162	32	Clear AI Latch High	1	1=clear	W (Pulse)
194	32	Clear AI Latch Low	1	1=clear	W (Pulse)
347	1	Enable the average value of the previous AI values of one channel for all AI	1	0=disable 1=enable (Default=0)	R/W/E
348	1	Enable average of all enable channel, High/Low Alarm value of all AI average value and Average latched values for all AI channels	1	0=disable 1=enable (Default=0)	R/W/E
595	8	Enable/Disable AI channel	1	0=disable 1=enable (Default=1)	R/W/E
628	1	Normal/Fast mode for AI	1	0=normal (16 bit) 1=fast (12 bit) (Default=0)	R/W/E
629	1	50/60Hz rejection for AI	1	1=50Hz 0=60Hz (Default=0)	R/W/E
631	1	AI data format	1	1=engineering 0=hex (Default=0)	R/W/E
632	1	Return the factory calibration (All)	1	1=clear	R/W/E
634	1	Clear AI Latch High (All)	1	1=clear	W (Pluse)
635	1	Clear AI Latch Low (All)	1	1=clear	W (Pluse)
636	8	AI Alarm High switch	1	0=disabled 1=enabled	R/W/E
668	8	AI Alarm Low switch	1	0=disabled 1=enabled	R/W/E
700	8	AI Alarm High mode	1	0=Moment 1=Latched	R/W/E
732	8	AI Alarm Low mode	1	0=Moment 1=Latched	R/W/E
764	8	AI High Alarm	1	0=OK 1=alarm (Clear)	R/W (Pulse)
796	8	AI Low Alarm	1	0=OK 1=alarm (Clear)	R/W (Pulse)
828	1	High Alarm of Average value of all AI channel	1	0=OK 1=alarm (Clear)	R/W (Pulse)
829	1	Low Alarm of Average value of all AI channel	1	0=OK 1=alarm (Clear)	R/W (Pulse)

Appendix C: Modbus Register Tables

(3xxxx) AI address					
Begin address	Points	Description	Registers per Point	Range	Access Type
0	8	Analog Input	word	-32768 ~ +32767	R
144	8	Average value of one channel	word	-32768 ~ +32767	R
176	1	Average value of all enabled AI channel	word	-32768 ~ +32767	R
177	1	Average value of all maximum latched AI value	word	-32768 ~ +32767	R
178	1	Average value of all minimum latched AI value	word	-32768 ~ +32767	R
236	8	Analog Latched value (High)	word	-32768 ~ +32767	R
268	8	Analog Latched value (Low)	word	-32768 ~ +32767	R
320	1	AI (channel number)	word	0 ~ 16	R

(4xxxx) AO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
59	1	Average times for every channel	word	0 ~ 40	R/W/E
174	1	Enable/Disable AI channel	word	0 ~ 65535	R/W
198	1	High alarm value for average value of all AI channel	word	0 ~ 65535 or -32768 ~ +32767	R/W/E
199	1	Low alarm value for average value of all AI channel	word	0 ~ 65535 or -32768 ~ +32767	R/W/E
296	8	High alarm value for AI	word	-32768 ~ +32767 (Default=32767)	R/W/E
296	8	Low alarm value for AI	word	-32768 ~ +32767 (Default=-32768)	R/W/E
427	1	Type code for AI	word	Refer to type code table	R/W/E

Appendix C: Modbus Register Tables

C-4. ET-7015 I/O Address Mapping



Appendix D: Modbus Application Notes

Detailed Modbus Address Table for ET-7015

(0xxxx) DO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
595	7	Enable/Disable AI channel	1	0=disable 1=enable (Default=1)	R/W/E
629	1	50/60Hz rejection for AI	1	0=50Hz 1=60Hz (Default=1)	R/W/E
631	1	AI data format	1	1=engineering 0=hex (Default=0)	R/W/E
632	1	Return the factory calibration (All)	1	1=clear	R/W/E
830	1	Enable/ Disable calibration(All)	1	0=disable 1=enable	R/W
831	1	Zero calibration command of ch0	1	1=run (pulse)	R/W
832	1	Span calibration command of ch0	1	1=run (pulse)	R/W
833	1	Zero calibration command of ch1	1	1=run (pulse)	R/W
834	1	Span calibration command of ch1	1	1=run (pulse)	R/W
835	1	Zero calibration command of ch2	1	1=run (pulse)	R/W
836	1	Span calibration command of ch2	1	1=run (pulse)	R/W
837	1	Zero calibration command of ch3	1	1=run (pulse)	R/W
838	1	Span calibration command of ch3	1	1=run (pulse)	R/W
839	1	Zero calibration command of ch4	1	1=run (pulse)	R/W
840	1	Span calibration command of ch4	1	1=run (pulse)	R/W
841	1	Zero calibration command of ch5	1	1=run (pulse)	R/W
842	1	Span calibration command of ch5	1	1=run (pulse)	R/W
843	1	Zero calibration command of ch6	1	1=run (pulse)	R/W
844	1	Span calibration command of ch6	1	1=run (pulse)	R/W

(3xxxx) AI address					
Begin address	Points	Description	Registers per Point	Range	Access Type
0	7	Analog Input	word	-32768 ~ +32767	R

Appendix D: Modbus Application Notes

(4xxxx) AO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
110	7	Temperature offset	word	-128 ~ 127	R/W/E
271	1	Modbus NetID	word	1 ~ 255	R/W
142	7	Resistance offset	word	0 ~ 255	R/W/E
427	7	Type code for AI	word	20 ~ 83 (hex)	R/W/E

Note:

Unit of temperature offset is 0.1°C, valid range: -128 ~ 127

Unit of resistance offset is 0.1 ohm, valid range: 0 ~ 255

Appendix D: Modbus Application Notes

C-5. ET-7018Z Address Mapping

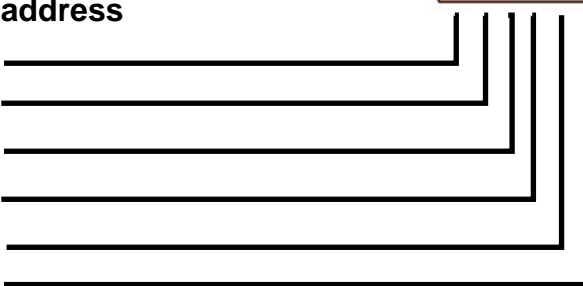
AI Channel Modbus address

AI0	30000
AI1	30001
AI2	30002
AI3	30003
AI4	30004
AI5	30005
AI6	30006
AI7	30007
AI8	30008
AI9	30009



DO Channel Modbus address

DO0	00000
DO1	00001
DO2	00002
DO3	00003
DO4	00004
DO5	00005



Appendix D: Modbus Application Notes

Detailed Modbus Address Table for ET-7018Z

(1xxxx) Read Only Coils					
Begin address	Points	Description	Registers per Point	Range	Access Type
336	1	High alarm for the average value of all AI registers	1	0=ok 1=alarm	R
337	1	Low alarm for the average value of all AI registers	1	0=ok 1=alarm	R

(0xxxx) DO address					
Begin address	Points	Description	Registers per Point	Range	Access Type
0	6	Digital Out	1	0=off 1=on	R/W
162	10	Clear AI Latch High	1	1=clear	W (pulse)
194	10	Clear AI Latch Low	1	1=clear	W (pulse)
347	1	Enable the average value of the previous AI values of one channel for all AI	1	0=disable 1=enable (default=0)	R/W/E
348	1	Enable average of all enable channel, High/Low Alarm value of all AI average value and Average latched values for all AI channels	1	0=disable 1=enable (default=0)	R/W/E
349	1	Save module nick name to EEPROM	1	1=write	W (pulse)
431	1	Write DO Power On value to EEPROM	1	1=write	W (pulse)
432	1	Write DO Safe value to EEPROM	1	1=write	W (pulse)
435	6	Power On value for DO	1	0=off 1=on (default=0)	R/W/E
515	6	Safe value for DO	1	0=off 1=on (default=0)	R/W/E
595	10	Enable/Disable AI channel	1	0=disable 1=enable (default=1)	R/W/E
627	1	Enable/Disable CJC	1	0=Disable 1=Enable (default=1)	R/W/E
629	1	50/60Hz rejection for AI	1	0=50Hz 1=60Hz (default=1)	R/W/E
631	1	AI data format	1	1=engineering 0=hex (default=0)	R/W/E
632	1	Return the factory calibration (all)	1	1=clear	R/W (pulse)
634	1	Clear AI Latch High (all)	1	1=clear	W (pulse)

Appendix D: Modbus Application Notes

635	1	Clear AI Latch Low (all)	1	1=clear	W (pulse)
636	10	AI Alarm High switch	1	0=disabled high alarm 1=enabled high alarm	R/W/E
668	10	AI Alarm Low switch	1	0=disabled low alarm 1=enabled low alarm	R/W/E
700	10	AI Alarm High mode	1	0=Moment 1=Latched	R/W/E
732	10	AI Alarm Low mode	1	0=Moment 1=Latched	R/W/E
764	10	AI High Alarm	1	0=OK 1=alarm (clear)	R/W (pulse)
796	10	AI Low Alarm	1	0=OK 1=alarm (clear)	R/W (pulse)
828	1	High Alarm of Average value of all AI channel	1	0=OK 1=alarm (clear)	R/W (pulse)
829	1	Low Alarm of Average value of all AI channel	1	0=OK 1=alarm (clear)	R/W (pulse)
830	1	Enable/Disable calibration	1	0=disabled 1=enabled	R/W
831	1	Zero calibration channel 0	1	1 = write	W (pulse)
832	1	Span calibration channel 0	1	1=write	W (pulse)

(3xxxx) AI address					
Begin address	Points	Description	Registers per Point	Range	Access Type
0	10	Analog Input	word	-32768 ~ +32767	R
143	1	CJC temperature	word	-32768 ~ +32767	R
144	10	Average value of one channel	word	0 ~ 65535 or -32768 ~ +32767	R
176	1	Average value of all enabled AI channel	word	0 ~ 65535 or -32768 ~ +32767	R
177	1	Average value of all maximum latched AI value	word	0 ~ 65535 or -32768 ~ +32767	R
178	1	Average value of all minimum latched AI value	word	0 ~ 65535 or -32768 ~ +32767	R
236	10	Analog Latched value (High)	word	0 ~ 65535 or -32768 ~ +32767	R
268	10	Analog Latched value (Low)	word	0 ~ 65535 or -32768 ~ +32767	R
310	1	DO (channel number)	word	0 ~ 79	R
311	1	Power on value for DO (channel number)	word	0 ~ 79	R
312	1	Safe value for DO (channel number)	word	0 ~ 79	R
320	1	AI (channel number)	word	0 ~ 16	R
350	1	OS image version	word	123 (hex) means version=1.2.3	R
351	1	Total firmware version	word	123 (hex) means version=1.2.3	R

Appendix D: Modbus Application Notes

352	1	CPU lib version	word	123 (hex) means version=1.2.3	R
353	1	I/O firmware version	word	123 (hex) means version=1.2.3	R
354	1	Xserver lib version	word	123 (hex) means version=1.2.3	R
355	1	TCP/IP lib version	word	123 (hex) means version=1.2.3	R
356	1	Modbus lib version	word	123 (hex) means version=1.2.3	R
357	1	Web lib version	word	123 (hex) means version=1.2.3	R
358	1	Modbus communication status	word	0= no error -1=CRC error -2=timeout	R
360	1	Pair connection	word	0=normal 1=timeout 2=disconnected	R

(4xxxx) AI address					
Begin address	Points	Description	Registers per Point	Range	Access Type
59	1	Average times for every channel	word	0 ~ 40	R/W/E
174	1	Enable/Disable AI channel	word	0 ~ 65535	R/W
198	1	High alarm value for average value of all AI channel	word	0 ~ 65535 or -32768 ~ +32767	R/W/E
199	1	Low alarm value for average value of all AI channel	word	0 ~ 65535 or -32768 ~ +32767	R/W/E
271	1	Modbus address (Net ID)	word	1 ~ 255	R/W/E
296	10	High alarm value for AI	word	-32768 ~ +32767 (Default=32767)	R/W/E
328	10	Low alarm value for AI	word	-32768 ~ +32767 (Default=-32767)	R/W/E
427	10	Type code for AI	word	Refer to type code table	R/W/E
491	10	CJC offset of channel	word	-4096 ~ 4096 (unit = 0.01 °C)	R/W/E
589		CJC update setting	word	0=stop CJC update 1=start CJC update 2=update CJC once only after this command is received	R/W/E

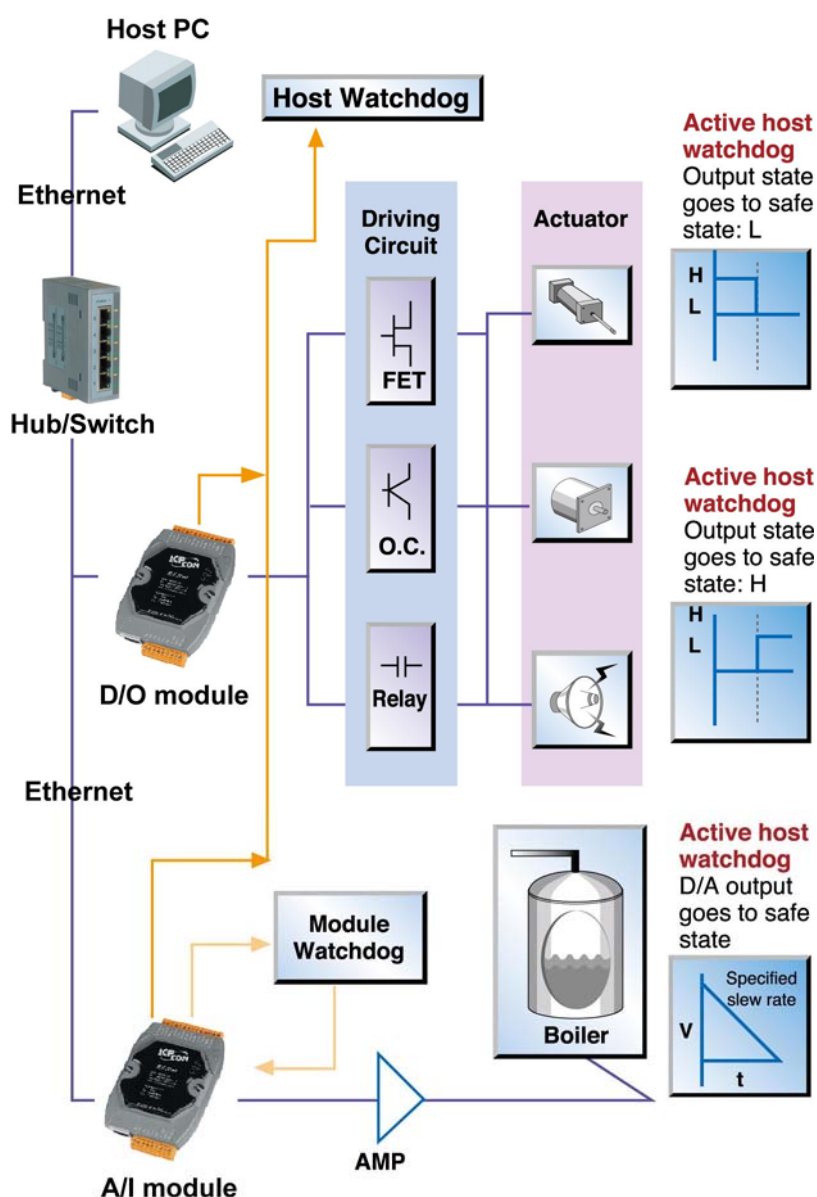
Appendix D: Modbus Application Notes

Dual Watchdog

Dual Watchdog consists of **Module Watchdog** and **Host Watchdog**.

The **Module Watchdog** is a built-in hardware circuit that will reset the CPU module if a failure occurs in either the hardware or the software. If the application does not refresh the watchdog timer within 0.8 seconds, the watchdog circuit will initiate a reset of the CPU.

The **Host Watchdog** is a software function that can be used to monitor the operating status of the host. Its purpose is to prevent network communication problems or a host failure. If the Watchdog timeout interval expires, the module will return all outputs to a predefined Safe value (Refer to the **Safe Value** application note), which can prevent the controlled target from unexpected situation.



Appendix D: Modbus Application Notes

Safe Value

If the time of the Host PC losing Modbus/TCP communication with the module is greater than the host WatchDog timer setting (called WDT timeout), the output of the Digital and Analog channels is set to the Safe Value, and the count of the host WDT events is increased by one.

AO address **40558** is the address of the Host WDT events. The value of the WDT events will be not stored into EEPROM, and will return to 0 after the module is rebooted. DO address **00515** is the first address of the Safe value and the total number of channels depends on the type of module.

For example:

Address **00515** to **00518** records the Safe value for the 4-Channel ET-7017.

Be careful to set the ON value to DO address **00432** to write the DO Safe value to the EEPROM of the ET-7000 DO module after using Modbus commands (05 or 15) to change the Power ON value.

While the WDT timeout is set, the module can also receive the Modbus/TCP commands (05, 06, 15 and 16) to change the DO or AO value without needing to clear the host watchdog timeout value.

● Configuration via the Web page

Browse to the homepage of the ET-7000, and click the “Modbus I/O Settings” link in the Configuration Section of the Main Menu tree.

Channel	OFF	ON
0	<input checked="" type="radio"/>	<input type="radio"/>
1	<input type="radio"/>	<input checked="" type="radio"/>
2	<input type="radio"/>	<input checked="" type="radio"/>
3	<input type="radio"/>	<input checked="" type="radio"/>
4	<input type="radio"/>	<input checked="" type="radio"/>
5	<input type="radio"/>	<input checked="" type="radio"/>
6	<input type="radio"/>	<input checked="" type="radio"/>
7	<input type="radio"/>	<input checked="" type="radio"/>

0=off/1=on (default=0)

Submit

Click the ON/OFF radio box to set the Safe value and then click the button to

Appendix D: Modbus Application Notes

enable the settings to take effect.

AI High/Low Alarm

ET-7017 and ET-7017-10 module equip with the High/Low Alarm function. When the alarm function is enabled, the specified registers are the alarm indicator. The alarm function is to compare the analog input value with given high alarm value and low alarm value.

Address **00636** to **00667** can be used to enable/disable the AI High Alarm function. Address **00668** to **00699** can be used enable/disable the AI Low Alarm function.

ET-7017 AI High/Low Alarm Switch Table

Channel Number	AI High Alarm		AI Low Alarm	
	Register	Description	Register	Description
AI0	00636	0: Disable / 1:Enable	00668	0: Disable / 1:Enable
AI1	00637	0: Disable / 1:Enable	00669	0: Disable / 1:Enable
AI2	00638	0: Disable / 1:Enable	00670	0: Disable / 1:Enable
AI3	00639	0: Disable / 1:Enable	00671	0: Disable / 1:Enable
AI4	00640	0: Disable / 1:Enable	00672	0: Disable / 1:Enable
AI5	00641	0: Disable / 1:Enable	00673	0: Disable / 1:Enable
AI6	00642	0: Disable / 1:Enable	00674	0: Disable / 1:Enable
AI7	00643	0: Disable / 1:Enable	00675	0: Disable / 1:Enable
AI8	00644	0: Disable / 1:Enable	00676	0: Disable / 1:Enable
AI9	00645	0: Disable / 1:Enable	00677	0: Disable / 1:Enable

Address **40296** to **40327** records the High Alarm value. Address **40328** to **40359** records the Low Alarm value. By the default, the High Alarm value is 32767 and the Low Alarm value is -32768.

ET-7017 AI High/Low Alarm Value Table

Channel Number	High Alarm Value of AI		Low Alarm Value of AI	
	Register	Description	Register	Description
AI0	40296	-32768 ~ 32767	40328	-32768 ~ 32767
AI1	40297	-32768 ~ 32767	40329	-32768 ~ 32767
AI2	40298	-32768 ~ 32767	40330	-32768 ~ 32767
AI3	40299	-32768 ~ 32767	40331	-32768 ~ 32767
AI4	40270	-32768 ~ 32767	40332	-32768 ~ 32767

Appendix D: Modbus Application Notes

AI5	40271	-32768 ~ 32767	40333	-32768 ~ 32767
AI6	40272	-32768 ~ 32767	40334	-32768 ~ 32767
AI7	40273	-32768 ~ 32767	40335	-32768 ~ 32767
AI8	40274	-32768 ~ 32767	40336	-32768 ~ 32767
AI9	40275	-32768 ~ 32767	40337	-32768 ~ 32767

The analog input High/Low Alarm contains two alarm types, **Momentary Alarm** and **Latch Alarm**. Address **00700** of Modbus register can be used to set the High Alarm type of channel 0 and the total number of channels depends on the type of module. Address 00732 of Modbus register can be used to set the Low Alarm type of channel 0.

ET-7017 AI High/Low Alarm Type Table

Channel Number	AI High Alarm Type		AI Low Alarm Type	
	Register	Description	Register	Description
AI0	00700	0: Momentary Alarm 1: Latch Alarm	00732	0: Momentary Alarm 1: Latch Alarm
AI1	00701	0: Momentary Alarm 1: Latch Alarm	00733	0: Momentary Alarm 1: Latch Alarm
AI2	00702	0: Momentary Alarm 1: Latch Alarm	00734	0: Momentary Alarm 1: Latch Alarm
AI3	00703	0: Momentary Alarm 1: Latch Alarm	00735	0: Momentary Alarm 1: Latch Alarm
AI4	00704	0: Momentary Alarm 1: Latch Alarm	00736	0: Momentary Alarm 1: Latch Alarm
AI5	00705	0: Momentary Alarm 1: Latch Alarm	00737	0: Momentary Alarm 1: Latch Alarm
AI6	00706	0: Momentary Alarm 1: Latch Alarm	00738	0: Momentary Alarm 1: Latch Alarm
AI7	00707	0: Momentary Alarm 1: Latch Alarm	00739	0: Momentary Alarm 1: Latch Alarm
AI8	00708	0: Momentary Alarm 1: Latch Alarm	00740	0: Momentary Alarm 1: Latch Alarm
AI9	00709	0: Momentary Alarm 1: Latch Alarm	00741	0: Momentary Alarm 1: Latch Alarm

The following are the descriptions for two alarm types.

- **Momentary Alarm**

The alarm status is cleared while the analog input is not exceeding the alarm value.

Appendix D: Modbus Application Notes

For example:

If analog input value of channel 0 (**30001**) > High Alarm value (**40296**), the address **00764** is 1, else it is 0.

If analog input Value of channel 0 (**30001**) < Low Alarm value (**40328**), the address **00796** is 1, else it is 0.

The address **00764** to **00795** is the High alarm indicator. If a High alarm occurred, the value of register is 1. In normal condition, it will be 0. The address **00796** to **00827** is the Low alarm indicator. If a Low alarm occurred, the value of register is 1. In normal condition, it will be 0.

- **Latch Alarm**

When the Latch Alarm mode is enabled, the register stays latched until the specified registers are cleared.

For example:

If analog input value of channel 0 (**30001**) > High Alarm value (**40296**), the address **00764** is 1, else if analog input value of channel 0 (**30001**) < Low Alarm value (**40328**), the address **00796** is 1.

The address **00764** to **00795** is the High alarm indicator. In normal condition, the value of register is 0. If a High alarm occurred, the value of register stays 1 until the address **00764** to **00795** is cleared. The address **00796** to **00827** is the Low alarm indicator. In normal condition, the value of register is 0. If a Low alarm occurred, the value of register stays 1 until the address **00796** to **00827** is cleared.

The address **00764** to **00795** can be used to clear the High Latch Alarm. The address **00796** to **00827** can be used to clear the Low Latch Alarm.

Configuration via the Web page

Browse to the homepage of the ET-7000, and click the “Modbus I/O Settings” link in the Configuration Section of the Main Menu tree.

Appendix D: Modbus Application Notes

Modbus Settings (AI High/Low Alarm)

Modbus Address	Function	Action
636	AI Alarm High Switch	0 OFF <input type="radio"/> ON <input type="radio"/>
		1 OFF <input type="radio"/> ON <input type="radio"/>
		2 OFF <input type="radio"/> ON <input type="radio"/>
		3 OFF <input type="radio"/> ON <input type="radio"/>
		4 OFF <input type="radio"/> ON <input type="radio"/>
		5 OFF <input type="radio"/> ON <input type="radio"/>
		6 OFF <input type="radio"/> ON <input type="radio"/>
		7 OFF <input type="radio"/> ON <input type="radio"/>

0=disabled/1=enabled (default=0)

View the Power ON/Safe Value via the Web page

Click the “Web HMI” link in the Web HMI Section of the Main Menu tree.

Analog Alarm High/Low Value				
No	High Alarm		Low Alarm	
	Register	Value	Register	Value
AI0	30764	0000	30796	0000
AI1	30765	0000	30797	0000
AI2	30766	0000	30798	0000
AI3	30767	0000	30799	0000
AI4	30768	0000	30800	0000
AI5	30769	0100	30801	0000
AI6	30770	0101	30802	0000
AI7	30771	0001	30803	0000

AI High/Low Latch

The address **30236** to **30267** records the maximum value of analog inputs and stays the value until another maximum input enters. The address **30268** to **30299** records the minimum value of analog inputs and stays the value until another minimum input enters.

View the Power ON/Safe Value via the Web page

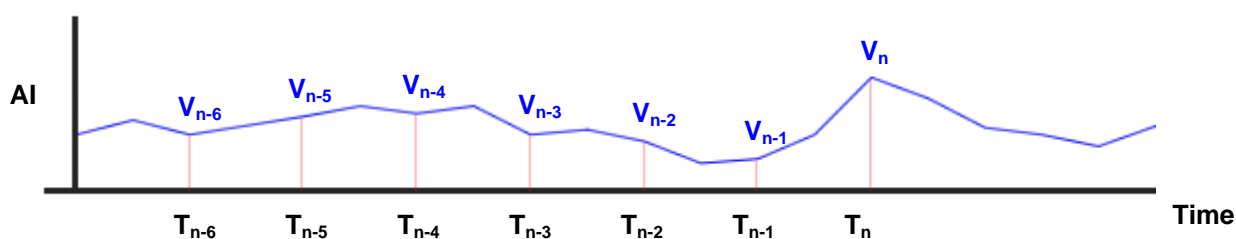
Click the “Web HMI” link in the Web HMI Section of the Main Menu tree.

Appendix D: Modbus Application Notes

Analog Latched High/Low Value

No	Latched High		Latched Low	
	Register	Value	Register	Value
AI0	30236	0019	30268	FFD2
AI1	30237	0018	30269	FFED
AI2	30238	0021	30270	FFE5
AI3	30239	0016	30271	FFEC
AI4	30240	002A	30272	FFEC
AI5	30241	0018	30273	FFE0
AI6	30242	0018	30274	FFE9
AI7	30243	0013	30275	FFE9

Moving average value of one AI channel



$$V_{Ave_n} = (V_n + V_{n-1} + V_{n-2} + V_{n-3} + \dots + V_{n-6}) / 7 \quad (7: 7 \text{ records})$$

The average value of each AI can be reached on a regular interval when the moving average function is enabled.

For example, a five-item simple moving average would be the sum of the reading value of the five most recent reading value, divided by five; a 20-item moving average would be the sum of the 20 most recent reading value divided by 20, and so on. Each item the most recent reading value is added to the equation and the most distant item is dropped off.

Register	Description
00347	Enable the moving value of the AI channels 0=disabled 1=enabled (Default=0)
40059	Average times for each AI channel 0 ~ 40

Address **30144** to **30153** recodes the average value of each AI channel.

ET-7017 AI Average value of one channel Table

Channel Number	Register	Description
AI0	30144	0 ~65535 or -32768 ~ +32767
AI1	30145	0 ~65535 or -32768 ~ +32767

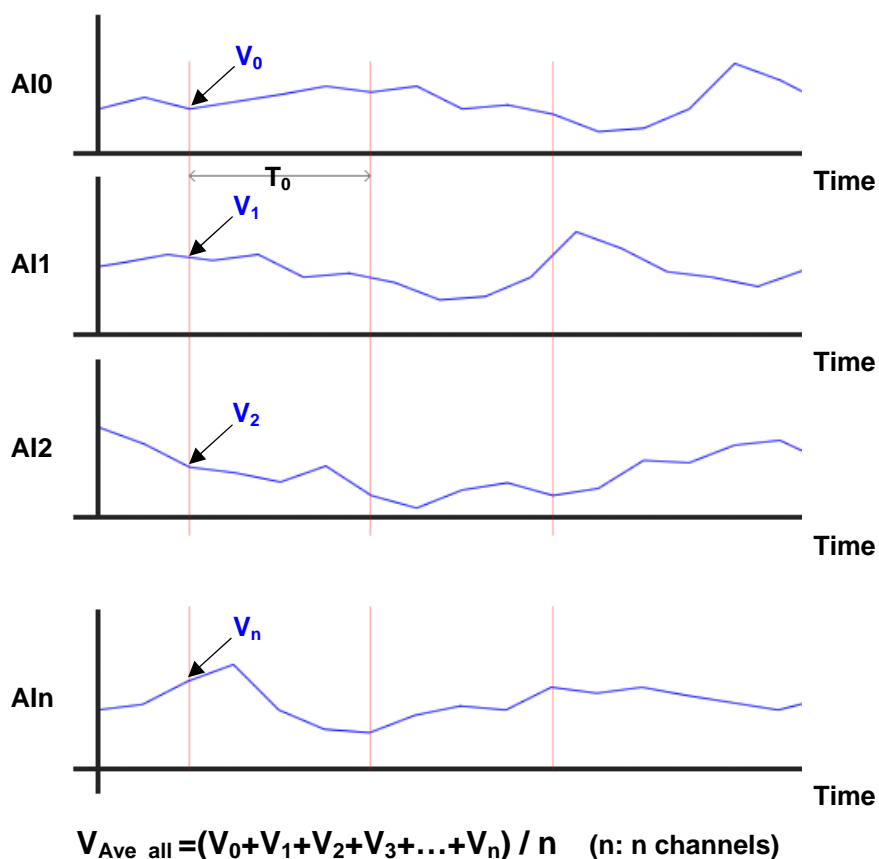
Appendix D: Modbus Application Notes

AI2	30146	0 ~65535 or -32768 ~ +32767
AI3	30147	0 ~65535 or -32768 ~ +32767
AI4	30148	0 ~65535 or -32768 ~ +32767
AI5	30149	0 ~65535 or -32768 ~ +32767
AI6	30150	0 ~65535 or -32768 ~ +32767
AI7	30151	0 ~65535 or -32768 ~ +32767
AI8	30152	0 ~65535 or -32768 ~ +32767
AI9	30153	0 ~65535 or -32768 ~ +32767

Average value of all AI channel

The value of all AI channel is obtained on a regular interval. The average of AI channels can be reached and then stored in the specified registers.

Register	Description
00348	Enable the average value of all enabled channels, High/Low Alarm value of all AI average value and Average Latched values. 0=disabled 1=enabled (Default=0)
30176	Average value of all enabled AI channel. Address 00595~00626 is used to enable/disable the AI channel. 0 ~ 65535 or -32768 ~ +32767



High/Low Alarm of the average value of all AI channels

The average value of all AI channels also can equip with the alarm function like the AI High/Low Alarm. For the detailed description, please refer the [AI High/Low Alarm](#).

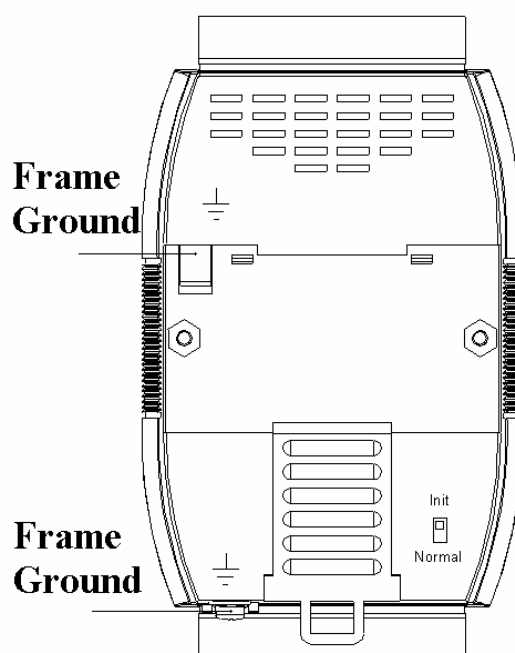
Register	Description
10336	High alarm for the average value of all AI registers 0=normal 1=alarm
10337	Low alarm for the average value of all AI registers 0=normal 1=alarm
40198	High alarm value for Average value of all AI channels 0 ~ 65535 or -32768 ~ +32767
40199	Low alarm value for Average value of all AI channels 0 ~ 65535 or -32768 ~ +32767

Appendix F: Frame Ground

Electronic circuits are constantly vulnerable to Electro-Static Discharge (ESD), which become worse in a continental climate area. ET-7000 series modules feature a new design for the frame ground, which provides a path for bypassing ESD, allowing enhanced static protection (ESD) capability and ensures that the module is more reliable.

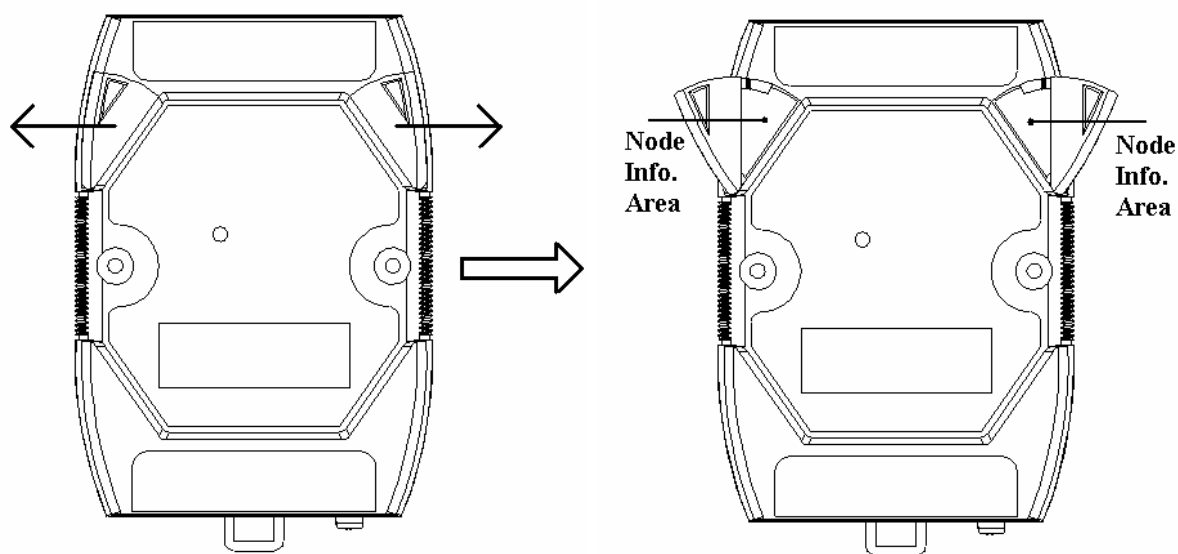
The following options will provide a better protection for the module:

The ET-7000 controller has a metallic board attached to the back of the plastic basket as shown in the Figure F-1 below. When mounted to the DIN rail, connect the DIN rail to the earth ground because the DIN rail is in contact with the upper frame ground as shown in the Figure F-2 below.



Appendix G: Node Information Area

Each ET-7000 module has a built-in EEPROM to store configuration information such as IP address, type code, etc. One minor drawback is that there are no visual indications of the configuration of the module. New ET-7000 modules include node information areas that are protected by a cover, as shown below, and can be used to make a written record of the node information, such as IP address, etc. To access the node information areas, first slide the covers outward, as shown in the figure below.



Appendix H: Technical Support

Should you encounter problems while using your ET-7000 series module, and are unable to find the help you need in this manual or on our website, please contact ICP DAS Product Support.

Email: service@icpdas.com

Website: <http://www.icpdas.com/service/support.htm>_

When requesting technical support, be prepared to provide the following information about your system:

1. Module name and serial number: The serial number can be found printed on the barcode label attached to the cover of the module.
2. Firmware and OS version: See **Section 3.1 Overview** for information regarding the command used to identify the firmware/OS version.
3. Host configuration: Host type and operating system (if needed).
4. If the problem is reproducible, please give full details describing the procedure used to reproduce the problem.
5. Specific error messages displayed. If a dialog box with an error message is displayed, please include the full text of the dialog box, including the text in the title bar.
6. If the problem involves other programs or hardware devices, please describe the details of the problem in full.
7. Any comments and suggestions related to the problem are welcome.

ICP DAS will reply to your request by email within three business days.